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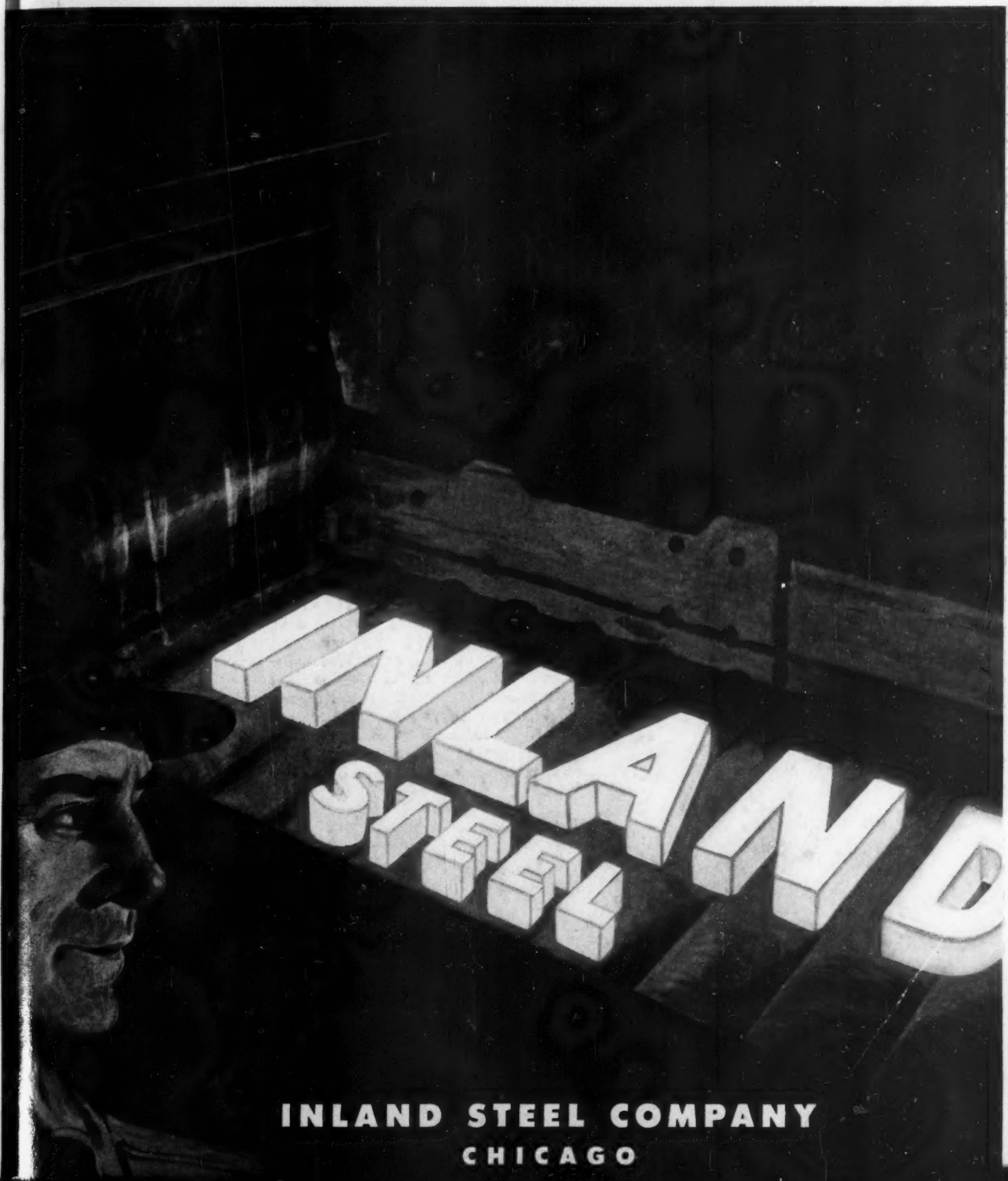

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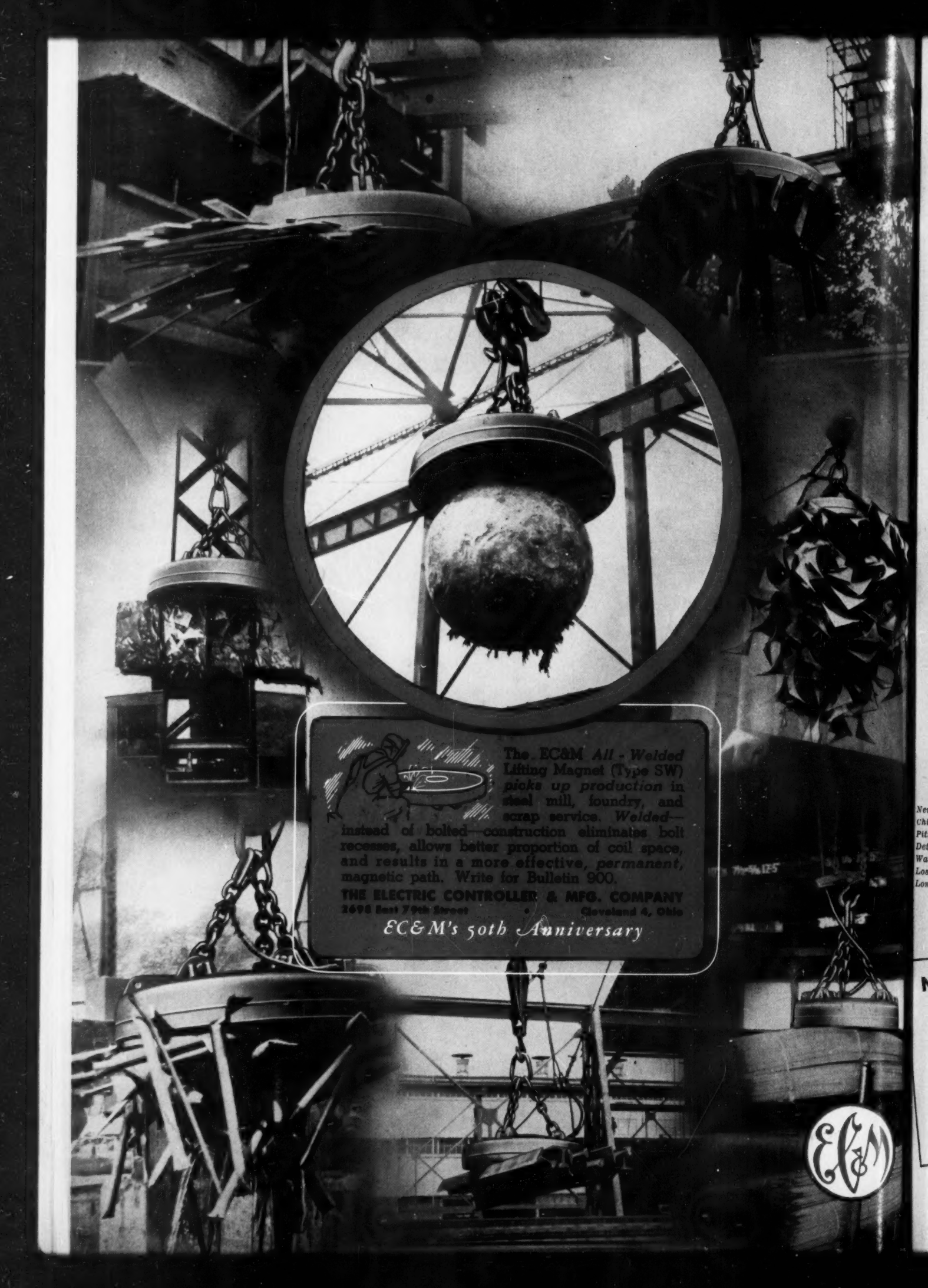
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1948 Yearbook of Industry Issue

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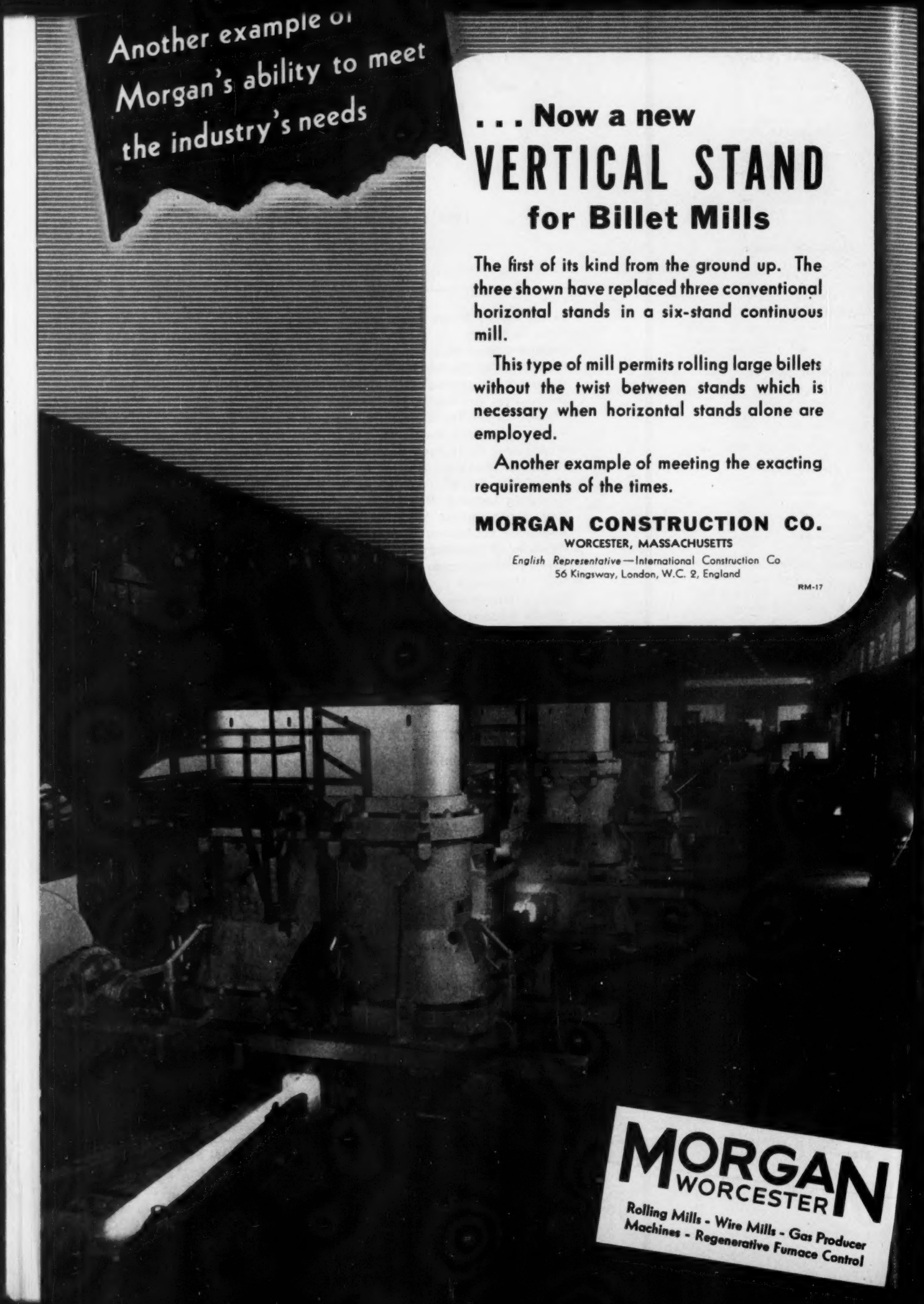
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January 5, 1948

Opportunity in 1948

As executives of America's metalworking industries grapple with the problems of the new year their spirits are buoyed by the realization that in most instances they still are confronted with a heavy demand for their goods and services and at the same time dismayed by the fact that problems of long-standing still remain to be solved.

The annoying thing about these problems is that nobody seems to be willing to face them head on. Ever since V-J Day, we as a nation have condoned policies which we know to be bad. We have permitted our government administration to base major decisions on economic beliefs so fallacious that one wonders why the public has swallowed them.

In 1946 the prize official fallacy was that wages could be increased substantially without affecting prices. In 1947 the blue ribbon Washingtonian sophistry was that wages are not an important factor in the inflation picture.

Today the nation is paying dearly for these politically inspired blunders. As 1948 unfolds we face the difficult task of making up for these past mistakes and of trying to avoid new ones. Specifically we are confronted with the delicate maneuver of easing ourselves from the uncomfortable plateau of inflation onto a lower and sounder base.

While the facets of inflation are numerous and complicated, there is one factor in which a meeting of minds could do much to change the entire complexion of the problem. That factor is the negotiation of wage contracts when the third round comes up for attention in the spring.

Considering all that has gone before, here will be a wonderful opportunity for employers and union chiefs to rise to new heights of statesmanship in labor relations. On labor's side is the realization now that sharp wage hikes in the past have not served their purpose. Also to labor's credit is the fact it has cleaned house and is in a position to assure more responsible leadership. On the employers' side is the experience of 1947 to show how priceless is uninterrupted production at high levels.

For both sides is the certainty that continued high production in the long run is the most effective brake that can be applied to inflation.

* * *

4 TO 1 STEEL RATIO: In view of the present state of international affairs, more than usual significance is found in the record of world steel ingot production in 1947.

Estimates indicate that the output of steel ingots and castings last year totaled 140,125,000 gross tons, of which 75,625,000 gross tons—or more than half—was produced in the United States. The world total of 140 million exceeds that of any other year with the single exception of the war year 1943.

This remarkable global total obscures serious deficiencies in certain countries, particularly in Europe. For instance, in the immediate prewar years of greater output (1937 or 1939), Great Britain, France, Belgium, Luxemburg, Italy, Spain, Sweden, Germany, Czechoslovakia, Poland, Austria and Hungary produced more than 58 million gross tons of steel. In 1947 these same countries turned out only 34,725,000 tons. Here is a deficiency, compared with prewar performance, of about 23,500,000 tons, most of which is accounted for by the meager current output of the once important German steel industry.

Aside from this serious situation in European steel production, the most significant feature of

(OVER)

1947 production figures is the short-term potential for steel output in Russia and in countries within her sphere of influence contrasted with that of countries which lie outside of Soviet domination. Estimating 22 million tons as Russia's output in 1947 and allowing liberally for her satellite countries, the total is in the neighborhood of 28 million tons. This leaves an impressive total of 112 million tons of production in nations outside of the iron curtain.

One would think that an adverse ratio of 4 to 1 in steel output would exert a sobering influence against impetuous decisions in the Kremlin. —pp. 322, 326

* * *

SHREWD FORECASTERS: Late in 1946 the editors asked representative executives in the metalworking industries to forecast the volume of business expected in 1947. The consensus of their replies figured out to a total of $55 billion. Today the best estimate of business volume of the metalworking industries in 1947 stands at $60 billion, indicating that our informants were shrewd prognosticators.

The 1947 figure represents an increase of 40 per cent over the business volume of 1946. About two-thirds of this increase is in gains in physical output and the other third is due to higher prices.

At the dawn of 1948 most businessmen look for a good year, providing that the economic apple cart it not tilted too violently by repercussions of the anti-inflation and foreign-aid programs. —p. 118

* * *

TRENDS IN MOTORDOM: In connection with the automobile industry's remarkable feat of turning out five million cars and trucks in 1947, it is interesting to note that the so-called independent group of builders—those outside the Big Three—accounted for an estimated 20 per cent of the industry's total sales, as compared with from 9 to 11 per cent in prewar years.

Competitive pressure in 1948 probably will tend to force these percentages in the direction of the prewar ratios but the independents still will have a head start on style and mechanical innovations with which to combat the advantages normally accruing to the larger companies.

While design and construction trends currently involve bodies, engines, transmission and drive, frame and chassis and wheels-tires-suspension systems, the most important long-range development on motordom's horizon is the high-compression automobile engine developed by C. F. Kettering and his associates. In years to come this new power unit is likely to require almost complete new manufacturing facilities, extending from foundries to final assembly and inspection. —p. 169

* * *

TOMORROW'S MARVELS: While the prospects for political, economic and social advancement in the nearby future seem to be clouded by numerous uncertainties, this is decidedly not true of the outlook for technological progress. It would be difficult indeed to conceive of a more glowing picture of noteworthy accomplishment than is painted in the brief, concise comments of the 246 contributors to this publication's "1948 Annual Forum on Technical Progress in Metalworking."

Engineers, metallurgists and other specialists who contribute to this feature are cautious by habit. They are more likely to understate than to overstate the value of a specific achievement. Considering this trait, it is significant that in no year since this annual round-up of expert opinion was inaugurated have contributors been as completely in accord as to the importance of current engineering achievements as in their 1948 comments. Nor in any previous year have they been so enthusiastic as they are today about the wonderful new developments that are "just around the corner."

Reading these appraisals gives one a welcome tonic for morale and renews one's confidence in the future of American industry. —p. 189

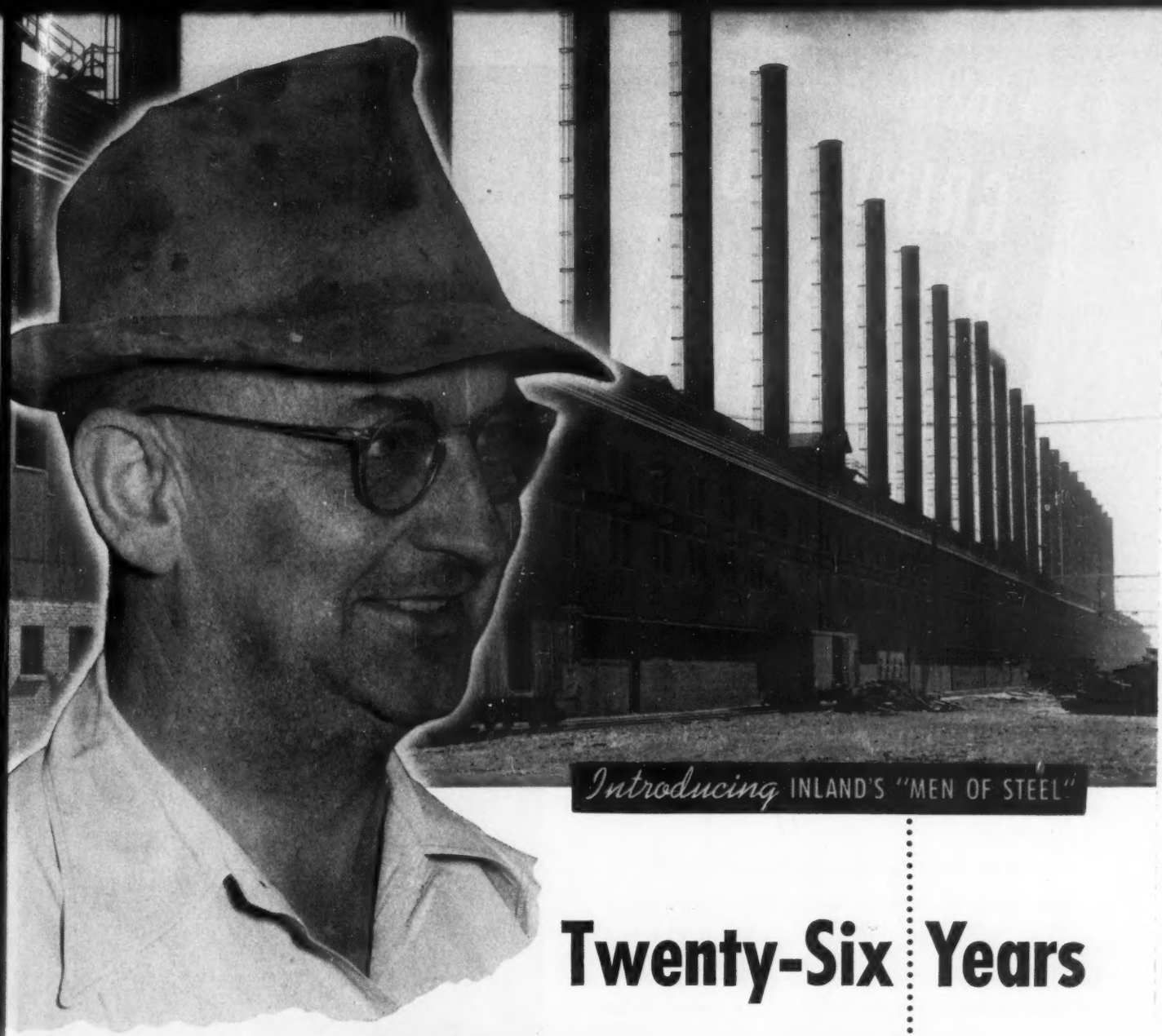
* * *

CRITICAL THIRD ERA: As a background for Washington events in 1948, Washington Editor E. C. Kreutzberg outlines three eras in the development of federal government policies in relation to business. We are still in the third era—the one that started in 1933 and which has as one of its objectives the abolition or easing of extreme cyclical depressions.

The nation still is struggling with this problem and probably will be for years to come. The attitude of Congress toward it in 1948 will bear watching. —p. 160

E. L. Shaner

EDITOR-IN-CHIEF



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News Summary

WHAT'S AHEAD?—Forecasts for 1948 call (with appropriate hedges) for physical production at the 1947 level or slightly higher (p. 118). Dollar volume likely will increase more than unit volume as prices continue to rise. Materials shortages and manpower again will be the limiting factors in metal manufactures as the industry seeks to better its peacetime record of $60 billion in 1947. Uncertainties for the year will be supplied by an anti-inflation campaign (strongly flavored with politics), the foreign aid program, and an uneasy international situation.

MORE STEEL?—Balance between supply and demand for steel products is still some distance removed, maybe 12, 18 or 24 months. Steel production (p. 124) should increase more than a million tons over the 84.7 million tons produced in 1947. Three million tons each of ingot, pig iron and coke capacity are being added. Sheet and strip capacity also is being upped 3 million tons. Production this year is not likely to reflect the full extent of the expansion, however, due to a shortage of metallics.

NONFERROUS METALS—Maximum domestic production plus large imports will be necessary to supply this year's requirements for nonferrous metals (p. 130). Demand for domestic industrial consumption will be heavy and to this will be added the requirements for government stockpiling and foreign aid.

DISTRIBUTION—Development of more equitable and efficient distribution systems will be a major problem (p. 134) for the producers of basic metals and for many manufacturers of finished products in the year ahead. Such systems should be designed to eliminate the gray markets, to insure the flow of materials to essential programs, and to keep inventories in balance.

TRANSPORTATION—Land transport industries—automobile, truck and rail—are zooming ahead (p. 142) within the limitations imposed by materials scarcities. Water and air transport are sick industries as far as manufacturing is concerned; aircraft and shipbuilding facilities, tremendously expanded during the war, are operating at only a fraction of their capacity. Auto production last year exceeded 5 million units and 5.5 million are expected this year. Civilian truck output hit a new high in 1947. Railroads still need equipment.

MACHINERY AND EQUIPMENT—Rising wages will serve the manufacturers of industrial machinery and equipment as a silent but effective sales force during 1948. The uptrend in hourly rates makes mandatory (p. 146) the most efficient utilization of labor. Machine tool builders expect 1948 volume to equal or exceed the 1947 total of $300 million (p. 144).

AGRICULTURE—Don't pity the farmer. His prices are high. Demand for his products appears assured for several more years—thanks to the foreign aid program. All of which adds up to continued high demand (p. 156) for farm machinery and equipment.

CONSTRUCTION—Demand for new building is strong, but high costs are causing much to be held back (p. 152). Considerable projected construction awaits stabilization of prices and freer flow of materials.

CONTAINERS—Canmakers have not yet reached their postwar peak (p. 154) due to the shortage of blackplate and tin. New processes are enabling one pound of tin to coat nearly as much steel as did two pounds formerly.

APPLIANCES—New records were established last year for many household appliances (p. 158) and production would have been even greater had steel been available in sufficient quantities. Some manufacturers are preparing for the return of a buyers' market.

EUROPE—Steel and metalworking industries of Britain and the continent of Europe made a notable improvement (p. 322) in 1947 over 1946. Most countries exceeded 1938 production and world steel output hit a peacetime peak.

Engineering News, P. 189 *Market Summary, P. 333*

PROSPECTS for 1948

Metalworking industries, with record $60 billion volume in 1947, look forward to continued high output this year. Production likely to be limited only by shortages of materials and manpower

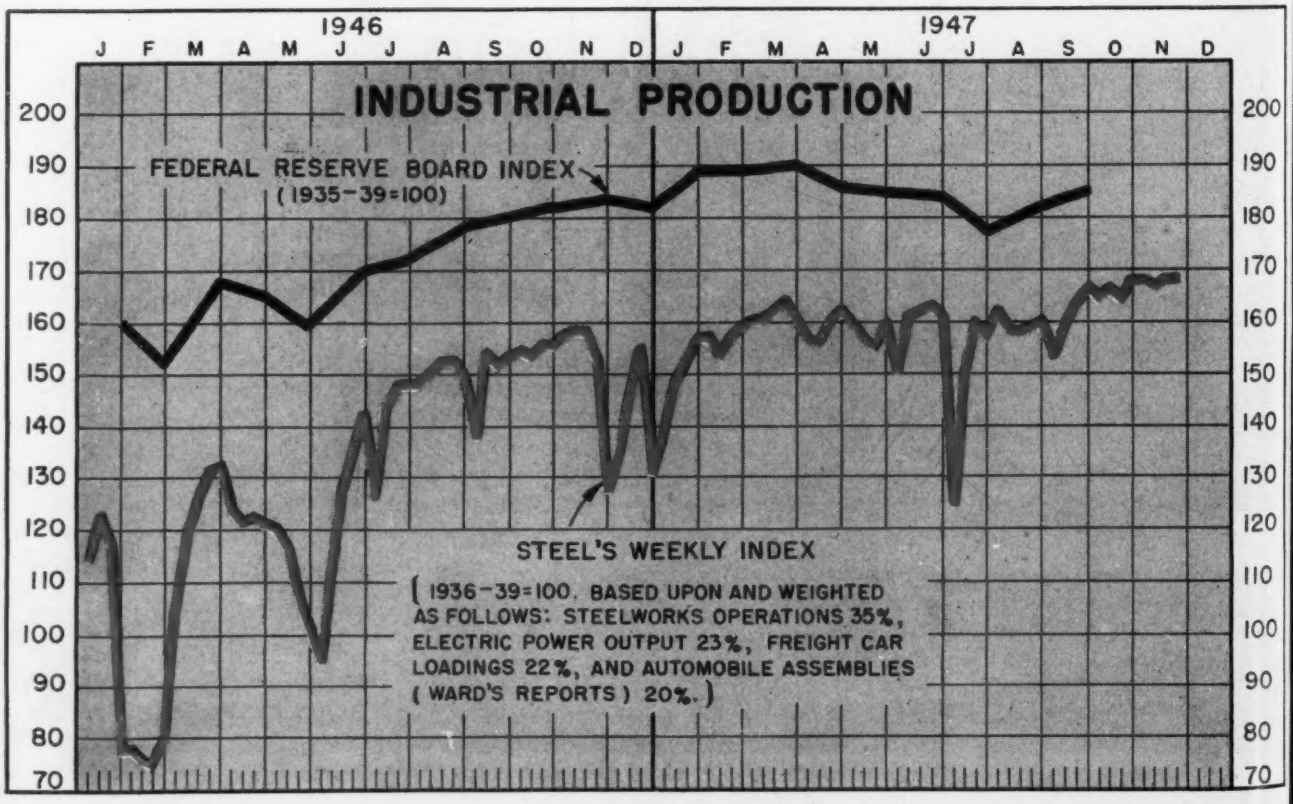
AMERICA'S metalworking industries last year marked up a record $60 billion peacetime volume, more than triple the 1939 output and about 40 per cent greater than the 1946 dollar volume.

Prospects for 1948, on the surface, are for a continuation on an equal or slightly higher level of physical output and perhaps a more substantial gain in dollar volume. Demand for most hard goods still is far from satisfied and new pressures are being added by the foreign aid program. Unless deflationary influences are set to work, metalworking output this year should be limited only by shortages of materials and the availability of manpower.

In attaining the record peacetime year, the metalworking industries were more than holding their position in the overall economy, which throughout the year appeared bent on an inflationary binge. Most segments of the economy rose to new peacetime highs. Gross national product in the closing months of the year was zooming along at an annual rate of $232 billion, national income was around $200 billion, the commodity price level rose around 15 per cent during the 12 months.

Production—The $60 billion volume of the metalworking industries reflects an increase both in physical output and in prices over 1946. While measurement of the overall physical output of the metalworking industries is difficult, a fair approximation can be obtained from their consumption of steel. Steel ingot output in 1947 was 84.7 million tons, a gain of 27 per cent over 1946 production of 66.6 million tons. On the basis of steel consumed it may be figured that the physical output of the metalworking industries also increased 27 per cent over the previous year. This indicates that two-thirds of the 40 per cent increase in dollar volume is due to greater physical output and one third to higher prices.

The indicated $60 billion output was about $5 billion more than was anticipated by metalworking executives at the beginning of 1947 (STEEL, Jan. 6, 1947,



By W. J. CAMPBELL
Associate Editor, STEEL

p. S-2). It compares with a volume of $19.5 billion in 1939 and $43.2 billion in 1946. Metalworking industries, as used here, include the producers of primary metals, fabricated metal products, machinery, electrical equipment and transportation equipment.

No. 1 limitation on 1947 production of the metalworking industries was the scarcity of raw materials, particularly steel, although certain of the nonferrous metals and other materials also were short.

Few indeed were the plants which were able to obtain all the steel they needed for full operations. Shutdowns for inventory accumulation were common even among plants with established sources of supply. Newer plants which lacked historical position on steel mill books had a hectic time in obtaining supplies even for partial operation.

Notwithstanding the difficulty of obtaining supplies, new records were established in the output of many products. Trucks, vacuum cleaners, washers, ironers, home freezers were among the products that led the way into new high fields.

Steelmakers themselves marked up a new record by producing over 25 per cent more than in any previous peacetime year.

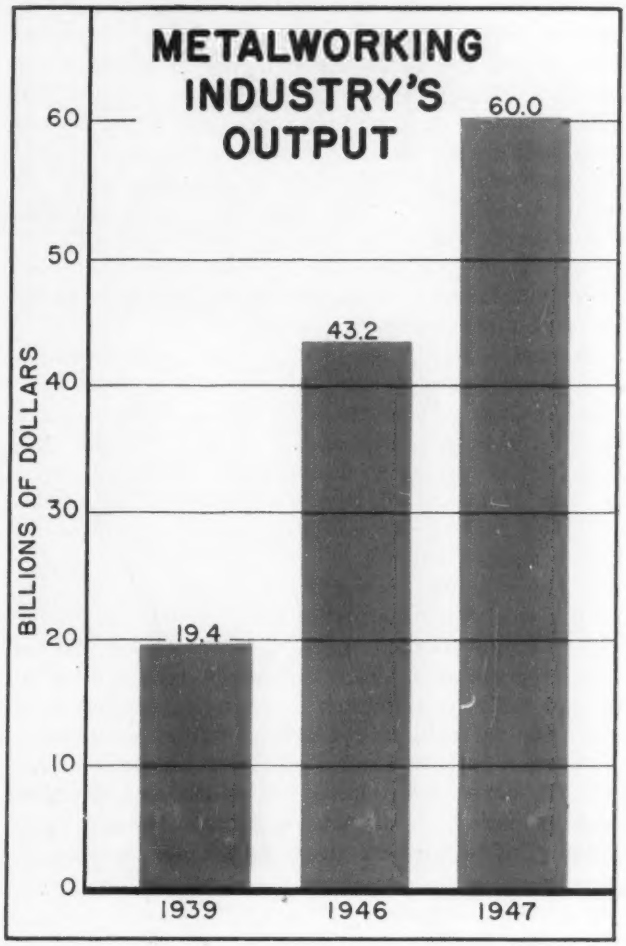
The Federal Reserve Board's index of industrial production touched 190, against the previous peacetime high of 183, set in November of 1946. The 1947 low was 176, well above the prewar peak.

STEEL's weekly index of industrial production, covering steelworks operations, electric power output, freight car loadings and automobile assemblies, consistently held to higher ground than in the preceding year.

Outlook—At the turn of the year, the pressure of demand for the products of the metalworking industries showed little slackening. Executives in many lines believe one to three years will be required to bring supply of their products into balance with demand. Steel executives doubt that a supply-demand balance in steel can be achieved before the end of 1949. Automobile builders envision a capacity market extending for several years ahead. Farm implement makers will require more than a year to fill the pent up demand for their products at home, in addition to which they will be called upon to produce a considerable quantity for export. Prospects likewise are good for continued strong demand for many household appliances, gas and oil field machinery and refinery machinery and equipment, and many types of industrial machinery.

Some individual products will reach a balance or surplus of supply over demand during the coming year. A few already are at such a point. Small radios, for example, are in excess supply at quoted prices and a weakening in the price structure has been apparent for some weeks.

Production prospects for 1948 are lifted moderately by scheduled increase in pig iron, steelmaking and finishing capacity which either became effective late in 1947 or will be brought in during the months ahead to ease the tight materials situation slightly. A shortage of steel, however, promises to continue the principal limitation on metalworking output this year.



Management and Labor—In sharp contrast to 1946 when steel and coal industry strikes caused a loss of 16 million tons of ingots and when many of the metalworking industries were tied up by strikes for weeks, 1947 was fairly free from paralyzing work stoppages.

Strikes there were and the number of man-days lost was higher than the prewar average, but most of the 1947 stoppages were brief and did not cause nearly the production loss of 1946.

Early in the year, new wage contracts were negotiated which provided wage increases averaging around 15 cents an hour. In many cases the agreements were reached without work stoppages. This was particularly true in the basic steel industry where few major producers suffered shutdowns.

Steel fabricating companies, organized by the United Steelworkers, resisted union attempts to foist the basic steel settlement on them and insisted upon individual negotiations. To a considerable extent they were successful, although the settlements were influenced by the basic steel agreement.

Generally the 1947 wage agreements gave the

workers more liberal vacation allowances, severance pay and certain other fringe concessions. Welfare plans played a more prominent part in negotiations than heretofore.

The spectre of portal-to-portal pay suits, which hung darkly over industry at the beginning of 1947, was dissipated by the wage settlements, some of which included a provision that the unions agree to drop all suits and not to institute further suits. Portal pay suits were in process of being washed out by congressional and court action at the time the unions retreated during wage negotiations.

An outstanding development in 1947 in the management-labor field was the passage by Congress over a presidential veto of the Taft-Hartley labor reform measure. This act, revising the original Wagner Act, signalized a turning of the tide which for 12 years had run in organized labor's favor. The law places numerous restrictions on labor unions, designed to correct abuses which had developed under the pro-union Wagner Act and which had been fostered by the Roosevelt administration. The law makes unions subject to government injunctions in strikes endangering the national health and safety, restricts union political activity, regulates union welfare funds and makes the union liable for damage suits for violation of contract, jurisdictional strikes and secondary boycotts. It bans closed shop provisions and permits union shop clauses only where they are favored by a majority of employees in a government-sponsored election. Unions are required to report on finances and internal affairs, and become subject to charges of unfair labor practices.

Bitterly resisted by organized labor as a "union-busting" law, the Taft-Hartley Act in effect has not seriously restricted the unions in their legitimate objectives.

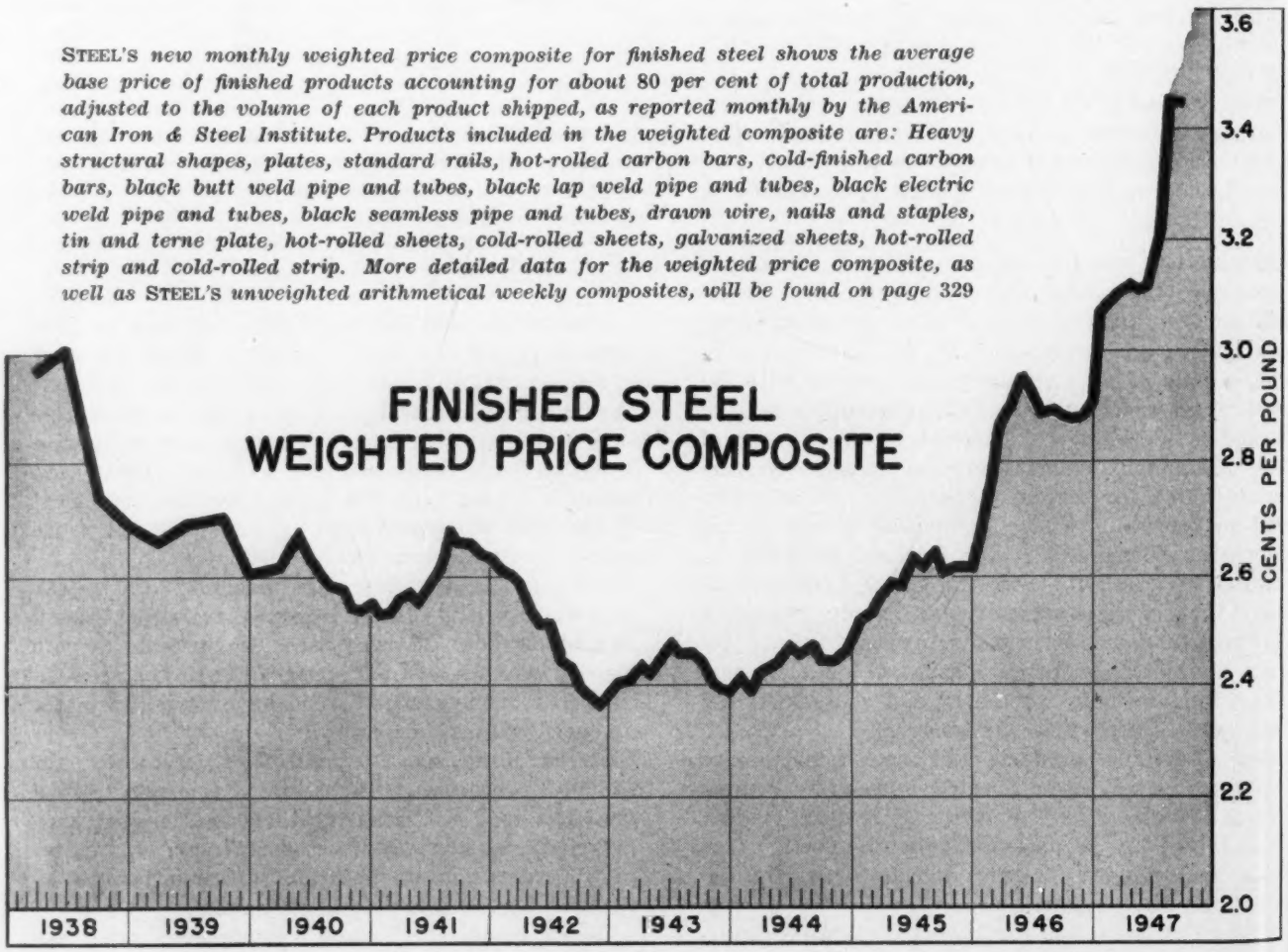
New Wage Demands — Metalworking management will be confronted with demands for a third round of postwar wage increases early this year. The unions will base their demands on the rising cost of living and upon the profit showing of industry during 1947.

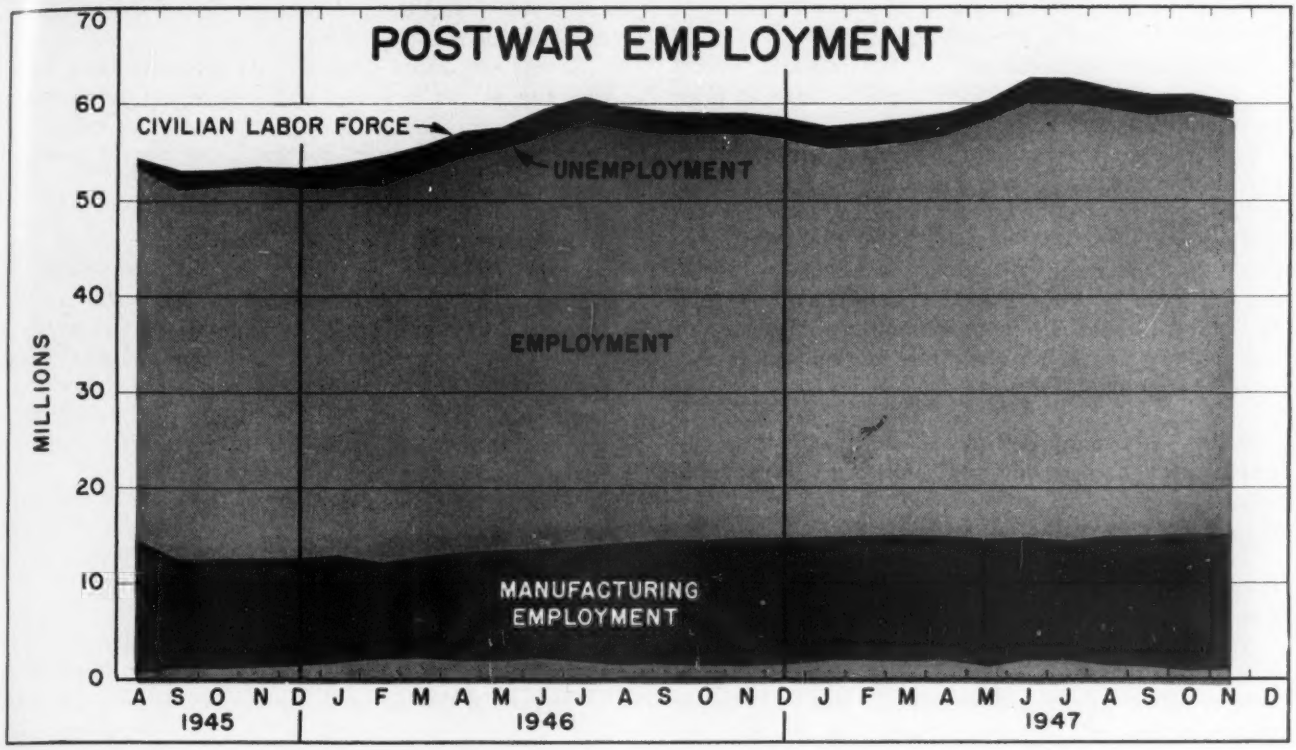
If the issue is left to management and labor, it probably can be resolved without serious work stoppages. The unions profess to be anxious to avoid strikes, which not only would mean wage losses the members can ill afford but which would bring public wrath down on organized labor's head and interfere with labor's planned political activity in 1948 elections.

Management, with heavy backlogs of unfilled orders and with a satisfactory earnings year behind it, may be willing to grant a moderate increase rather than risk new work stoppages.

That a third round of wage increases would be highly inflationary few people dispute. While living costs have been advancing rapidly, the industrial worker still is well ahead of the wage-price race as

STEEL'S *new monthly weighted price composite for finished steel shows the average base price of finished products accounting for about 80 per cent of total production, adjusted to the volume of each product shipped, as reported monthly by the American Iron & Steel Institute. Products included in the weighted composite are: Heavy structural shapes, plates, standard rails, hot-rolled carbon bars, cold-finished carbon bars, black butt weld pipe and tubes, black lap weld pipe and tubes, black electric weld pipe and tubes, black seamless pipe and tubes, drawn wire, nails and staples, tin and terne plate, hot-rolled sheets, cold-rolled sheets, galvanized sheets, hot-rolled strip and cold-rolled strip. More detailed data for the weighted price composite, as well as* STEEL'S *unweighted arithmetical weekly composites, will be found on page* 329





compared with prewar. New wage increases would be followed quickly by new price increases and the inflationary spiral would be accelerated.

Production Costs — The settlement to be made on the unions' third round wage demands will be the most influential factor in determining the course of production costs, now the metalworking industry's No. 2 problem, second only to the scarcity of materials.

Wages have led the upward trend in production costs through recent years. Average hourly earnings for manufacturing workers have advanced from 72 cents in 1939 to $1.36 in the closing months of 1947, an increase of 90 per cent.

Prices of the basic raw material, steel, have increased moderately. According to STEEL's weighted finished steel price composite, based on the prices of leading finished products adjusted to the volume of each sold, steel prices averaged 2.657c a pound in 1939 and 3.374c a pound in the third quarter of 1947, an increase of 27 per cent. However, many consumers actually paid considerably higher prices by purchasing in the gray market, by obtaining their supplies through scrap conversion deals, by purchasing from warehouses when unable to buy from mills, or by buying steel which did not fit their specifications and reworking it.

Nonferrous metals have risen sharply (see page 130). Coal and coke prices are up 20 to 40 per cent.

Transportation costs are up and likely to go higher. Railroads were granted a 17.6 per cent increase effective Jan. 1, 1947. This was followed by an interim increase of 8.9 in October, and the carriers now have pending a petition for a permanent increase of 30 per cent over the rates which prevailed during the past summer.

These increases have likewise affected the suppliers of metalworking industries and have resulted in steadily mounting prices for all goods and services purchased.

The pending demand for another round of wage increases, the railroads' applications for higher rates and other inflationary factors do not presage any early reversal in the upward trend of costs.

Labor Productivity — Although experiences of the various companies vary widely, labor productivity as a whole improved in 1947 over 1946. Part of this improvement was due to the absence of bitter labor disputes last year and part to a relatively improved flow of materials to work stations. Industrial executives have noted that output per man-hour drops sharply during periods of labor unrest, improves during periods of peace and calm.

To date, no accurate gage for measuring labor productivity over a large area of industry is available. The Bureau of Labor Statistics currently is attempting to formulate such a means of measurement.

In the basic steel industry, fewer man-hours were required to produce a ton of steel last year than in 1946. Figuring total man-hours worked by wage earners and total tons of ingots produced, 12.38 hours were required for each ton of ingot produced in the first three quarters of 1947, compared with 13.46 hours in 1946, and 12.2 hours in 1944, the peak production year of the war.

Employment — An unusually high level of employment prevailed throughout 1947. In November, 58.6 million persons were employed out of a total civilan labor force of 60.2 million, leaving only 1.6 million unemployed. The unemployment figure is be-

lieved to be about the minimum that can be achieved in peacetime under a free economy.

Government employment service officials expect employment levels to continue through 1948 at close to 60 billion.

Labor shortages were noted by metalworking companies in many areas throughout the year. The scarcity mostly was in skilled classifications. However, the materials shortage so overshadowed the tight labor situation that most companies were able to obtain enough men to work the materials they were able to obtain. Should the materials supply improve substantially, which is not likely, the labor shortage soon would become acute.

Prices — Commodity prices continued their upward surge throughout 1947, although at a somewhat slower rate of advance than that of late 1946—immediately following decontrol.

The average advance was around 15 per cent, although increases varied widely among the various commodities.

The Bureau of Labor Statistics index of wholesale prices of all commodities rose from 140 in December, 1946, to 160 in December of last year. Manufactured products were up from 136 to 152 and metals and metal products advanced from 135 to 150.

In the tight sellers' market that prevailed throughout last year, list or quoted prices did not always reflect the true market, as many purchasers of new automobiles and even buyers of steel from irregular sources can readily testify.

Should organized labor win its demands for a third round of wages increases and should the inflationary effects of the foreign aid program not be offset by anti-inflation measures, further price boosts through 1948 appear unavoidable.

Government Policies — Probably the most important measures affecting business generally to be taken by the government this year, will be the foreign aid program and the anti-inflation campaign.

The European Recovery Plan contemplates shipping substantial amounts of goods now scarce in this country to the participating nations. Inevitably this will increase the pressure for the remaining goods at home and in effect will be inflationary.

Whether the anti-inflation measures that the government will effect will be sufficient to offset the inflationary pressures arising under the ERP plus those already present is doubtful.

Foreign Aid Implications — Requirements of the 16 western European countries in the Committee of European Economic Co-operation for finished steel for 1948 run close to 3.15 million tons, or 60 per cent more than the annual export rate to these countries in the first half of 1947. Moreover, the requirements concentrate heavily in those products which are in tightest supply in the United States—sheets, strip,

U.S. REVENUES, EXPENDITURES, DEBT

Year	Total Receipts 000,000	Per Capita Receipts	Expenditures 000,000	Per Capita Expenditures	Gross Debt 000,000	Per Capita Debt
1915...	$ 698	$ 7.03	$ 761	$ 7.66	$ 1,191	$11.83
1916...	782	7.77	734	7.29	1,225	11.96
1917...	1,124	11.00	1,978	19.36	2,975	28.57
1918...	3,664	35.38	12,697	122.58	12,243	115.65
1919...	5,152	49.07	18,523	176.40	25,482	240.09
1920...	6,695	62.83	6,482	60.84	24,297	228.32
1921...	5,625	51.98	5,538	51.18	23,976	221.09
1922...	4,109	37.40	3,795	34.54	22,964	208.97
1923...	4,007	35.93	3,697	33.15	22,349	200.10
1924...	4,012	35.44	3,507	30.98	21,251	186.86
1925...	3,780	32.91	3,529	30.73	20,516	177.82
1926...	3,962	33.98	3,584	30.76	19,643	167.70
1927...	4,129	34.94	3,493	29.56	18,510	156.04
1928...	4,042	33.73	3,643	30.40	17,604	146.69
1929...	4,033	33.19	3,848	31.67	16,931	139.40
1930...	4,177	33.01	3,994	32.42	16,185	131.49
1931...	3,190	25.70	4,091	32.99	16,801	135.37
1932...	2,005	16.06	4,948	41.28	19,487	155.93
1933...	2,079	16.54	4,325	40.91	22,538	179.21
1934...	3,115	24.64	6,370	56.19	27,053	213.65
1935...	3,800	29.88	7,583	58.00	28,701	225.07
1936...	4,115	32.17	9,068	69.41	33,545	261.20
1937...	5,028	40.93	8,281	62.69	36,427	281.82
1938...	5,854	47.89	7,304	59.70	37,167	285.43
1939...	5,164	43.21	8,765	70.65	40,445	308.34
1940...	5,387	44.09	9,127	70.65	42,967	325.63
1941...	7,607	57.29	12,774	74.16	48,961	367.54
1942...	12,799	95.25	32,491	241.80	72,422	537.35
1943...	22,281	163.25	78,182	572.83	136,696	1001.55
1944...	44,149	319.92	93,743	679.29	201,003	1455.52
1945...	46,456	332.78	100,404	719.25	258,682	1853.01
1946...	43,037	305.25	65,018	461.17	269,422	1910.97
1947...	44,703	311.77	42,505	296.44	258,376	1801.94

Annual Statements of the Treasury.

AVERAGE EARNINGS IN MANUFACTURING INDUSTRIES

Year	Average Hourly Earnings 25 Mfg. Industries	Average Weekly Earnings 25 Mfg. Industries	Hours Worked Per Week 25 Mfg. Industries	Average Hourly Earnings: Farm Implements	Automobile	Electrical	Iron & Steel	Foundries	Machines & Machine Tools	Hardware & Small Parts
1930..	$0.589	$25.84	43.9	$0.618	$0.697	$0.645	$0.661	$0.620	$0.628	$0.556
1931..	0.564	22.62	40.4	0.602	0.681	0.632	0.636	0.605	0.627	0.531
1932..	0.498	17.05	34.8	0.546	0.609	0.594	0.531	0.518	0.586	0.482
1933..	0.491	17.71	36.4	0.535	0.609	0.571	0.524	0.502	0.568	0.457
1934..	0.580	20.06	34.7	0.609	0.713	0.648	0.628	0.580	0.619	0.531
1935..	0.599	22.23	37.2	0.666	0.752	0.667	0.655	0.602	0.637	0.545
1936..	0.619	24.39	39.5	0.675	0.791	0.669	0.670	0.612	0.646	0.557
1937..	0.695	26.80	38.7	0.777	0.916	0.756	0.818	0.703	0.714	0.638
1938..	0.716	24.43	34.3	0.800	0.953	0.801	0.830	0.738	0.735	0.658
1939..	0.720	27.04	37.6	0.805	0.953	0.796	0.841	0.749	0.751	0.670
1940..	0.739	28.54	38.6	0.818	0.971	0.814	0.850	0.762	0.776	0.700
1941..	0.814	33.62	41.2	0.905	1.086	0.904	0.957	0.834	0.854	0.792
1942..	0.924	40.03	43.0	1.004	1.248	1.012	1.037	0.965	1.010	0.920
1943..	1.014	45.88	45.0	1.089	1.295	1.067	1.135	1.067	1.080	1.048
1944..	1.067	48.83	45.6	1.137	1.312	1.132	1.183	1.138	1.148	1.103
1945..	1.097	48.46	44.2	1.154	1.277	1.151	1.246	1.144	1.177	1.124
1946..	1.190	47.55	40.1	1.234	1.367	1.237	1.348	1.231	1.243	1.186
1947..	....	....	...	....	....	....	....	....	....	....
Jan. .	1.268	51.62	40.8	1.294	1.411	1.283	1.381	1.300	1.304	1.254
Feb. .	1.279	52.10	40.8	1.299	1.416	1.280	1.370	1.297	1.307	1.250
Mar...	1.285	52.08	40.6	1.310	1.416	1.289	1.379	1.316	1.312	1.253
Apr. .	1.304	52.79	40.5	1.312	1.417	1.303	1.533	1.312	1.316	1.253
May .	1.329	53.65	40.4	1.394	1.492	1.368	1.556	1.344	1.331	1.273
June .	1.347	54.25	40.3	1.418	1.497	1.391	1.547	1.372	1.356	1.294
July.	1.354	53.61	39.7	1.423	1.508	1.399	1.539	1.395	1.372	1.313
Aug. .	1.365	54.17	39.7	1.427	1.503	1.401	1.556	1.402	1.373	1.317
Sept. .	1.383	55.83	40.4	1.440	1.527	1.413	1.571	1.414	1.384	1.320

National Industrial Conference Board.

NATIONAL INCOME, NATIONAL GROSS PRODUCT SINCE 1929

(Billions of Dollars)

	National Income	Gross National Product
1929	87.4	103.8
1930	75.0	90.9
1931	58.9	75.9
1932	41.7	58.3
1933	39.6	55.8
1934	48.6	64.9
1935	56.8	72.2
1936	64.7	82.5
1937	73.6	90.2
1938	67.4	84.7
1939	72.5	90.4
1940	81.3	100.5
1941	103.8	125.3
1942	136.5	159.6
1943	168.3	192.6
1944	182.3	210.6
1945	182.8	213.1
1946	178.2	203.7
1947†	200.0	232.0

†Estimated.
Source: Department of Commerce.

tin mill products and semifinished steel for the manufacture of these products.

In metallics, CEEC requests are even more disturbing. The European countries have asked for 2.5 million tons of such materials, chiefly in scrap and pig iron, both of which are in critically short supply at home. This compares with an annual rate of exports of 400,000 tons in the first half of 1947.

In addition, CEEC wants large quantities of equipment made largely of iron and steel. These requests include $370 million in agricultural equipment, $80 million in mining machinery, $150 million in electrical equipment, $168 million in petroleum equipment, $100 million in steel plant equipment, $203 million in inland transport and $500 million in machinery not elsewhere specified.

That Congress will pare down these requests is obvious. Strong objections to the export of scrap already have been voiced and it has been pointed out that Europe has relatively larger supplies of scrap than has the United States. Many of the equipment requests are likely to be reduced. Nevertheless, the exports of metals and machinery and equipment are likely to be so substantial as to aggravate already existing shortages at home.

Anti-inflation — One of the great unknowns at the start of the new year is the kind and extent of anti-inflationary measures that will be attempted by the government.

To date, most discussion of anti-inflationary steps has centered on price, wage and distribution controls. These proposals were outlined by President Truman in his message to the special session of Congress. The proposals were vague. The administration asked for "limited" and "selective" controls.

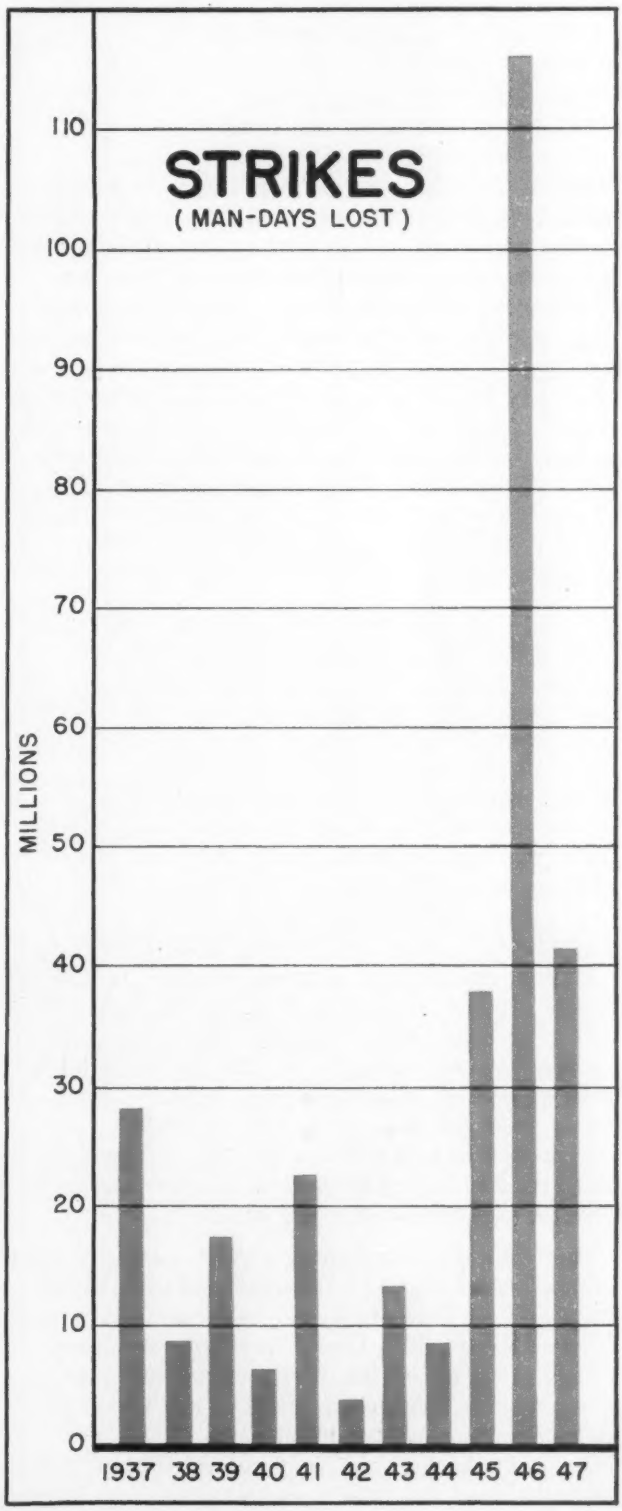
The control proposals were received with little enthusiasm by either business or the Republican majority in Congress. Business suggested that instead of a return to compulsory allocation of materials that producers and the government co-operate in voluntary allocations for needed programs, such as was effected by the government and the steel producers in the freight car program.

Another attack on inflation, which has received less attention than the President's control proposals but which may be more effective in putting the brakes on inflation, may be restrictions on credit. Consumer credit may be tightened by more strict controls on installment buying, business credit by restricting bank credit. Some economists believe this attack, by shrinking the supply of money, would be more effective than attempts to control the use and distribution of scarce goods.

The danger of tightening credit lies in the chance that a recession or depression may be started which would go farther than planned. Government men considering this plan remember what happened in 1920 when the Federal Reserve Board raised the rediscount rate to halt the rise in prices and the depression of the early twenties followed.

Taxes — The Republican leadership in Congress is committed to tax reform, although the extent of relief now appears likely to be limited by increased federal expense under the foreign aid program and possibly increased appropriations for national defense.

The metalworking industry is interested chiefly in liberalization of depreciation allowances, modification of surtax, repeal or modification of section 102, penalizing the accumulation of surplus, reduction in the capital gains tax, elimination of double taxation of corporate dividends and reductions in the individual income tax rates.



The STEEL INDUSTRY

Three million tons of ingot capacity to be added, but shortage of metallics will continue to limit production. Some increase seen for 1948

By B. K. PRICE
Eastern Editor, STEEL

WHILE 3 million tons of ingot capacity are scheduled to be added this year, steel consumers may not receive an increase of more than a third that amount, due primarily to continued shortage of metallics.

Actually this shortage is charged with a loss of steel last year of close to 6 million tons. Final output in 1947 is estimated at approximately 84.7 million tons, short by almost 6.5 million tons of the rated capacity of 91.2 million tons, with the major portion of this difference ascribed to stringency in pig iron and scrap. The remainder, incidentally, is charged principally to labor disturbances, although small in relation to the 16 million tons lost through strikes in 1946.

Output To Increase—Steel leaders vary in their appraisals of the outlook for steel supply this year. The more conservative estimate an increase of a million tons; others go somewhat higher, and, accordingly, base their optimism on more cheerful calculations with respect to pig iron and scrap.

Encouraging is the fact that three million tons of pig iron capacity is in the process of being installed for completion before the end of this year. Its effect will depend much upon how rapidly during the year it will be brought into production, but once installed, it should bring total capacity up to an all-time high.

Highest capacity to date was reached around the middle of 1944, amounting to 68,446,000 tons. Since that time considerable capacity was written off, resulting in a net reduction by the beginning of last year of around 2,700,000 tons. Actually, rated capacity over the past year was 65,709,200. Add 3 million tons of new capacity and the new peak likely to be reached before the end of the year will be 68,709,200, assuming no further write-off.

Ore Adequate—Operators appear confident there will be sufficient good ore to support such capacity. They are less sure concerning fuel, but point to approximately 3 million tons of new coke oven capacity scheduled for completion by the end of this year, and to washing facilities being installed at various plants to improve the quality of the coal.

Further, less high grade metallurgical coal will be moving abroad this year than last.

While there was a stringency in iron last year, it is interesting to note that, based on the rate for the first 10 months, blast furnace production amounted to 59.2 million tons, with pig iron output totaling 58.5 million tons for the highest record in peacetime history and the fourth highest in all-time history. The three higher records were established during the last war, with the peak amounting to 61,007,439 tons of pig iron and achieved in 1944.

Estimated blast furnace production last year, including relatively modest tonnages of ferromanganese and spiegeleisen, actually fell short of rated capacity by almost 7 million tons.

Good Coking Coal Scarce—However, contributing to the gap between production and capacity last year was the poor quality of coking coal, estimated to have retarded output by at least 10 to 12 per cent. This situation should improve this year.

Some authorities believe the quality of coke will never get back to its one-time standard of several years before the war, for the reason that the cream of the good coking coal has been skimmed off. However, washing facilities, plus recent developments in the use of additions to the coal mix, and other improvements under way, will raise the general quality.

Stacks Undergo Repairs—Dampening the more immediate outlook is the fact that repairs to blast furnaces and also coke ovens have seldom, if ever, been on a larger scale. This development dates back to the war, when various stacks were kept in operation beyond the normal period for relining to meet emergency demands—and then kept on still longer in many cases in an effort to meet the extraordinary requirements of the postwar period. Major repairs to coke ovens are curtailing pig iron production and will continue to do so for some time.

Still another complicating factor is the inability of both producers and consumers to build up backlogs with which to cushion themselves in the present emergency. Some furnaces went out after the war and at least a few went out with no prospects of their ever returning to operation. This threw added burden on furnaces remaining in blast and with postwar demand starting off and continuing at a high clip, the building of stocks has been literally out of the question, and especially so following the major steel and coal strikes in 1946, with pig iron producers and consumers operating on a hand-to-mouth basis ever since.

Scrap Scarcity Raises Iron Demand—Shortage of scrap has contributed to the stringency in iron. Some steel producers, upon occasion, have been forced

Blast furnace iron is charged into open hearth at South Works of Carnegie-Illinois Steel Corp. at Chicago. Shortage of metallics continues one of the industry's major worries

where the iron was available, to use as much as 70 per cent hot metal in their open hearths, against a normal mixture of 50 per cent iron and 50 per cent scrap. However, shortage of pig iron has also contributed to shortage of scrap, forcing the price of scrap, a highly mercurial commodity, well above the price of iron, and with the scrap often of inferior grade. As the scrap ratio went higher and the quality declined, production costs advanced and the ingot yield declined.

Consumption of scrap in 1947 is estimated at 53.1 million tons, of which 25.4 million tons was purchased scrap and 27.7 million tons was home scrap. This sumption of purchased scrap represents a 5 per cent increase over the previous record, established in 1942, and a 25 per cent increase over the melt in 1946.

Little Miscellaneous Scrap—During the war it was twice necessary to organize country-wide scrap drives, and attesting to their success is the fact that they not only met emergency demands, but cleaned up so much miscellaneous scrap lying around that even high prices of the past year failed to bring out tonnage in quantities desired.

However, as the new year advances there should be improvement in scrap supply. Not only will better pig iron supply ease some of the pressure, for one thing, but there are two other reasons: Government scrap, and greater obsolescence as production of durable goods increases. While the War Assets Administration has characterized estimates of 4 million tons of war surplus scrap in this country as being absurd, there unquestionably is a heavy tonnage available for processing. Through persistent efforts of committees of the steel, foundry and scrap industries and final recognition of the acuteness of the situation by top government officials, more government scrap may be channeled into consumption this year than in all other years combined since the war — this despite the fact that there is a growing disposition by Washington to conserve rather than scrap certain types of equipment.

Increase Conjectural — While conjectural as to what the actual increase in ingot production will be this year, most industry leaders see at least 1 million additional tons ahead, with the possibility of more. Assuming no major disruptions, predictions of as high as 3,000,000 tons have been made—but the qualifying assumption in these unsettled times may be too much to bank on. Even the loss of one week's production in the course of a year would account for the loss of 1,700,000 tons at the rate of recent output.

So taking the conservative estimate of increase of 1 million tons, what would this mean to finished production, which is the matter of direct concern to the steel consumer? An increase of 1 million tons would bring the total for this year up to 85.7 million tons, and allowing for a conversion loss of about 25 per cent, finished steel production should total around 64 million tons.

To hard pressed consumers of sheets and strip, pipe and plates, to say nothing of certain other products, this would appear to represent a small increase indeed in which all are to share. However, products in most demand will probably receive the major share of what additional steel there is to go around.

Sheet-Strip Capacity Expanded—This should be particularly true of sheets and strip, which have been under special pressure ever since the war. Expansion in sheet and strip facilities has received special emphasis from the beginning of the postwar era. Actually producers of these products set up a 3,180,000-ton expansion program which was to have been completed by the middle of last summer, but which because of strikes and delays in delivery of machinery and other equipment, especially electrical equipment, fell short of completion on schedule by fully 2 million tons. It is now hoped that this program can be wound up by the middle of this year, following which some still additional 400,000 to 500,000 tons of sheet and strip expansion is scheduled. The overall pro-

gram as it is now tentatively set up for completion this year involves 3,620,000 tons.

Needless to say, heavy expenditures for such expansion, the largest of all such programs, would not be made without due consideration as to where the necessary steel was to be obtained. Hence, sheet and strip will probably benefit most by whatever expansion there is in raw steel capacity.

Sheet Output at Peak—Last year sheet and strip production approximated 18 million tons for a new all-time record, surpassing the former peak of 16,100,000 tons in 1941. However, output still has a way to go in meeting the estimated 20 million tons which trade leaders believe would bring supply and demand into balance.

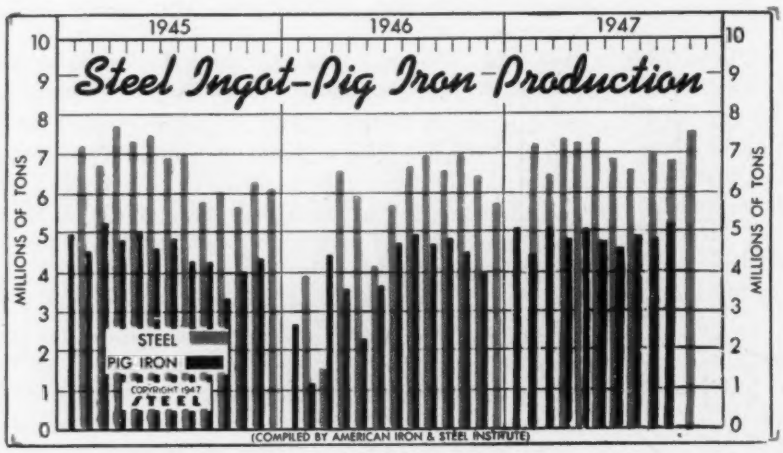
Interestingly, STEEL recently estimated hot-rolled sheet production for 1947 at 7,131,952 tons, based on shipments for the first nine months of the year—an increase of 29.2 per cent; cold-rolled at 5,352,039 tons, up 31.3 per cent; and galvanized at 1,589,203 tons, up 8.7 per cent. Electrical and enameling sheets at 572,731 tons showed the heaviest percentage gain of all, with 31.6.

Pipe Output May Rise—Pipe may also share better than average in the new steel available. Production last year is estimated to have been stepped up about 1.5 million tons to around 6 million tons, only slightly less than the war peak, and with new facilities gradually getting into operation, new melting capacity is being earmarked to feed these facilities. Major expansion is at Lorain, O., with work also going ahead at Gadsden, Ala., involving facilities for making electric pipe, 20 to 30 in. in diameter, and scheduled for completion around the middle of this year.

In general, with current production well in excess of prewar demand (1937-40 average was 3,700,000 tons) producers look for a balancing in supply and demand on most grades of merchant pipe within the next year or year and a half, and accordingly have been loath to plan expansion on too large a scale.

Line Pipe Demand Up—Greatest increase has been in line pipe with volume estimated far in excess of prewar average, and with fabricators unable to maintain capacity operations because of inability to get sufficient steel. Some are booked into 1952, this being one of the few products on which sellers are willing to commit themselves that far into the future. Merchant pipe capacity as of the beginning of last year was 7,650,000 tons, down from the all-time peak of 8,300,000 tons in 1944, with the decline due primarily to obsolescence of lap weld facilities.

Relief in plate supply, which, along with pipe, stands close behind sheets and strip in point of stringency, will depend primarily upon improvement in metallics. No important expansion in plate facil-



Iron, Steel Production

(Net Tons—000 omitted)

	Steel Ingots 1947	Steel Ingots 1946	Steel Ingots 1945	Pig Iron 1947	Pig Iron 1946
Jan.	7,213	3,872	7,204	5,071	2,645
Feb.	6,422	1,393	6,653	4,550	1,148
Mar.	7,307	6,507	7,706	5,123	4,424
Apr.	7,043	5,860	7,290	4,830	3,614
May	7,329	4,072	7,450	5,081	2,275
June	6,969	5,625	6,841	4,810	3,682
July	6,570	6,610	6,986	4,585	4,705
Aug.	6,982	6,887	5,735	4,917	4,898
Sept.	6,789*	6,518	5,982	4,801	4,687
Oct.	7,564	6,910	5,597	5,228	4,815
Nov.	....	6,409	6,200	....	4,435
Dec.	....	5,701	6,058	....	3,992
Total	....	66,364	79,702	....	*45,379

* Adjusted.

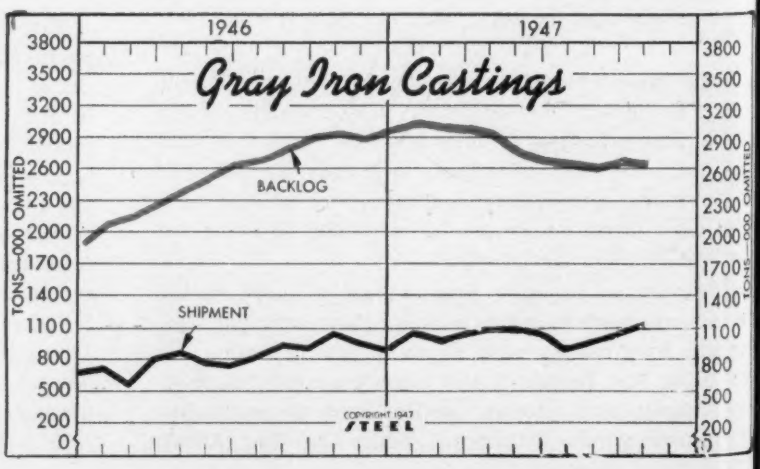
Gray Iron Castings

(U. S. Bureau of Census)

Tons—000 omitted

	Shipments 1947	Shipments 1946	Backlogs* 1947	Backlogs* 1946
Jan.	1,078	727	3,021	2,096
Feb.	1,010	572	2,987	2,182
Mar.	1,090	820	2,979	2,285
Apr.	1,097	886	2,908	2,430
May	1,097	783	2,783	2,531
June	1,038	757	2,711	2,640
July	913	840	2,657	2,708
Aug.	952	973	2,631	2,814
Sept.	1,025	937	2,680	2,897
Oct.	1,154	1,078	2,669	2,953
Nov.	....	987	....	2,940
Dec.	....	909	....	2,980
Mo. Ave.	....	856	....	2,621

* Unfilled orders for sale to the trade.



ities is under way, nor is any contemplated. Some producers declare that if they could operate existing facilities at even near present capacity they would be able to go far toward balancing supply and demand. During the past year the semi-integrated mills have had particular difficulty in maintaining rolling operations at more than three to four days a week.

Meanwhile, the continuous strip mills, which during the war more than doubled existing plate capacity, bringing production at one time up to more than 1,200,000 tons per month, continued to withdraw what little capacity they were still devoting to plates, that greater and more profitable production could be developed in sheets and strip for which the mills were originally intended and for which demand exceeded all other products.

Plates in Active Demand—In outstanding demand during the war, plates have continued in surprisingly active demand ever since, despite the sharp drop in shipbuilding. Especially active have been the postwar requirements for light plate. However, a none too profitable item at best under existing cost conditions, and with the mills unable to utilize fully the capacity that they have, producers have been hesitant to expand facilities. Particularly has this been true because of the potential capacity that always exists at the strip mills in case of emergency—and in case also, at some future time, demand for light flat products eases to the point where strip producers might find it advisable to compete for some plate business to reduce overhead.

The industry's billion dollar program includes also large investments for rolling and finishing facilities for bars, rods, wire and tin plate. Also included, in part, are substantial expenditures for converting government wartime facilities, since acquired by private companies, to peacetime purposes.

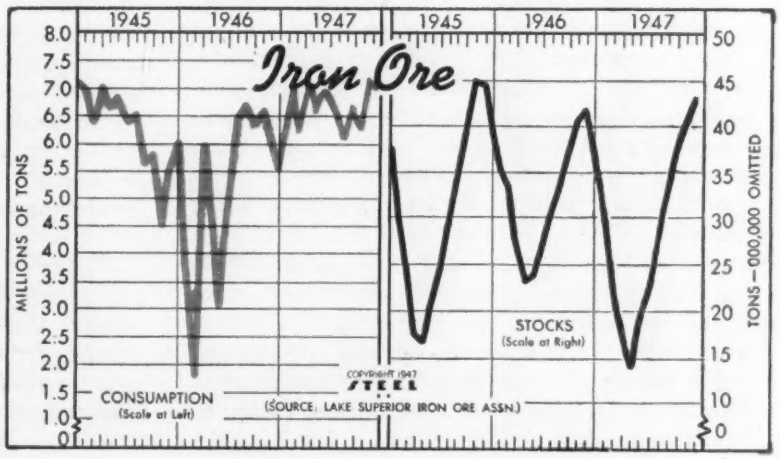
Under Expansion Pressure—Throughout the past year the steel industry was subjected to pressure by various governmental, labor and small business groups to provide a much larger program of expansion. Some Washington and labor economists envisioned an expansion of 10 to 30 million tons. The industry's position was that expansion on such a scale would not only be difficult, if not impossible, at this time, but highly unwarranted under existing conditions. Raw materials, including ore, could not be developed within reasonable time to support such a program, for one thing. Further, it was pointed out, a 10 million-ton expansion (the minimum expansion proposed) would in itself require more than 1.5 million tons of finished steel to build and would cost in excess of $2 billion, what with new facilities costing up to 3½ times as much as in 1939. Moreover, because of abnormal construction costs, steel produced in the new facilities would have to be priced at

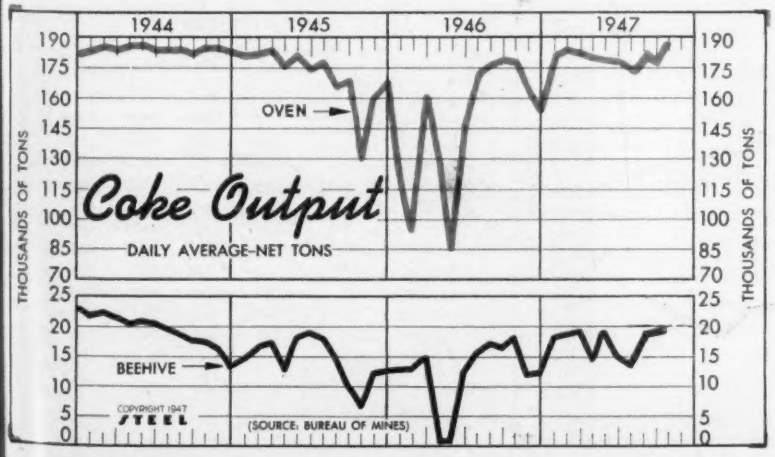
Iron Ore

(Lake Superior Iron Ore Assn.)

Gross tons—000 omitted

	Consumption		Stocks at Lake Erie Docks and Furnaces	
	1947	1946	1947	1946
Jan.	7,024	3,719	30,514	35,342
Feb.	6,264	1,748	24,317	33,647
Mar.	6,979	6,021	17,411	27,601
Apr.	6,579	4,769	13,555	23,079
May	6,885	2,990	17,618	23,905
June	6,500	4,995	21,746	26,265
July	6,156	6,460	28,440	30,439
Aug.	6,638	6,738	33,896	34,067
Sept.	6,492	6,380	38,370	37,573
Oct.	7,151	6,625	41,641	40,435
Nov.	7,068	6,131	43,010	41,919
Dec.	....	5,516	.....	37,465
Total	....	62,093	.....	.....





Coke Output

Bureau of Mines

(Daily Average—Net Tons)

	Oven		Beehive	
	1947	1946	1947	1946
Jan.	181,245	122,570	18,124	13,093
Feb.	183,189	93,985	18,372	13,140
Mar.	182,529	161,290	18,725	14,962
Apr.	179,428	128,394	14,315	713
May	178,398	83,019	18,922	869
June	177,416	148,100	15,054	42,600
July	173,312	172,700	13,582	15,600
Aug.	181,697	177,300	18,346	17,400
Sept.	179,872	179,200	19,397	16,700
Oct.	187,009	178,900	19,786	18,500
Nov.	.....	164,165	.....	12,028
Dec.	.....	153,826	.....	12,302
Ave.	.....	146,877	.....	11,991

least $20 above present levels, producers declared.

At least two years would be required to complete such expansion, even assuming it was given a high priority, and by that time, steel leaders estimate supply and demand should be in reasonable balance, in light of the expansion already under way. Actually, were it not for the 18 million tons lost since the end of the war due to labor strikes, this balance should now be close at hand.

Higher Output Without Expansion—Developments of a technological nature will result in expanding output in existing facilities, with the use of oxygen in open hearths, for one thing, already leading to encouraging results. Development of low-alloy, high-tensile steels permits three tons of material to do the work of four, through a reduction in gages.

As indicated, continued strong pressure for steel is expected in 1948. It is true that pipe lines are gradually filling in some directions, with consumer and durable goods being in better supply; should the present inflationary trend in prices continue (and general opinion is that it will) there may eventually, and possibly suddenly, be a decline in demand for goods. It is a possibility. However, most producers regard the outlook optimistically. While supply is gradually getting caught up with demand, balance is some months away, they claim, and especially now with the European Recovery Plan coming forward.

More Steel for Europe—This plan, from all that can be judged at this time, will not mean more steel for direct shipments abroad, although more will go to Europe at the expense of other sections of the world. To conserve steel for domestic use and to make sure that essential foreign rehabilitation needs are provided with as much steel as this country can afford, further export controls went into effect Jan. 1, bringing about 95 per cent of all steel products under regulation.

However, indirectly more steel will go abroad in the form of machinery, farm equipment and other essential items under this plan as currently proposed. To provide steel for these needs and yet at the same time take care of the more urgent domestic requirements, the administration has proposed "limited" and "temporary" controls on domestic distribution (with similar action proposed also on a few other commodities along with a suggestion for renewing price regulations).

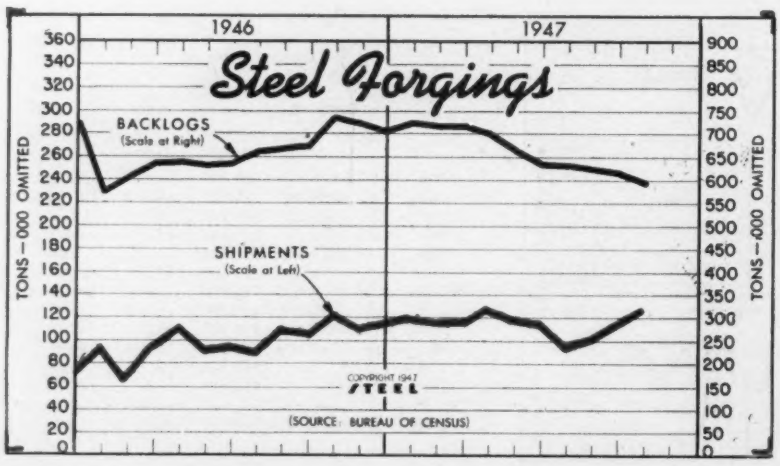
Oppose Controls—The steel industry and steel consuming industries generally have gone on record as opposed to such controls. Even sentiment voiced unofficially in the agricultural equipment industry, which might stand to benefit, is opposed to the artificial channeling of steel even on the restricted basis tentatively proposed.

In addition, Congressional majority leaders are against the revival of wartime regulations, fearing, as does business and industry, that the measures would not in the end be "limited" and "temporary," as proposed; and would serve only to disrupt production at a time when production is needed most.

Some Products in Balance—Certain products, such as alloys, stainless steel and cold drawn bars, are in reasonable balance with respect to supply and demand. However, they are exceptions and while there is modest easing in supply of the larger sizes of hot carbon bars and certain wire products, the overall picture is still tight. In most major lines, year-end arrearages were substantial, despite efforts of mills—only partially successful—to get order books in better balance.

Pricewise, the outlook also is still strong. A drive for still higher wages has already been begun, and still higher freight rates are in prospect, possibly by Mar. 1. Effective Oct. 13, last year, there was an increase in freight rates of 8.9 per cent, with steel products up 10 per cent. This increase was set up temporarily until the Interstate Commerce Commission had an opportunity to act on the railroads' original request for a permanent general increase of 26.8 per cent. Since then the carriers have asked for an additional 3 per cent.

Payrolls at Peak—Steel payrolls reached an all-time high in 1947 with prospects they will go still higher this year as talk persists of a third postwar round of wage increases this spring. Last spring steel wages were increased at an estimated cost to the industry of $240 million. This included general



Steel Forgings

Tons—000 omitted

	Shipments*		Unfilled Orders*	
	1947	1946	1947	1946
January	116	92	723	570
February	111	63	714	606
March	115	87	717	637
April	121	106	699	639
May	115	89	663	631
June	110	93	638	635
July	92	86	631	661
August	98	108	626	666
September	109	102	617	671
October	123	119	593	736
November	...	108	...	727
December	...	110	...	707

* Forgings for sale.

STEEL EMPLOYMENT, AVERAGE HOURS, WAGES, PAYROLLS

Period (1947)	Number Employees	Total Hours Worked	Aver. Hrs. Per Week Per Employee	Total Wages (Dollars)	Aver. Earnings Per Hr.	Total Wage-Salary Employees	Total Payrolls (Dollars)
Jan.	512,000	.....	40.3	126,083,000	1.381	601,200	155,778,000
Feb.	517,500	.....	39.0	110,294,000	1.370	606,700	139,482,000
Mar.	519,100	.....	38.2	120,737,000	1.379	608,800	150,560,000
Apr.	520,700	.....	40.0	136,328,000	1.533	610,700	168,266,000
May	524,600	.....	39.1	140,903,000	1.556	614,800	175,793,000
June	531,600	.....	38.1	133,945,000	1.547	622,600	167,625,000
July	531,300	.....	35.9	129,325,000	1.539	623,400	163,166,000
Aug.	532,900	.....	37.1	135,778,000	1.556	625,200	169,075,000
Sept.	527,500	.....	38.3	135,532,000	1.571	618,400	168,859,000
9 month Total	524,200	.....	38.4	1,170,044,000	1.495	614,600	1,459,742,000
1946							
Jan. & Feb.	441,900	89,545,200	24.0	117,681,600	1.314	522,300	169,890,500
Mar.	486,200	81,557,500	37.9	110,197,800	1.351	570,500	138,756,100
Apr.	496,600	79,343,800	37.2	106,370,300	1.341	581,800	134,347,800
May	477,000	68,930,000	32.6	93,618,200	1.358	562,900	121,422,200
June	491,900	73,074,200	34.6	98,208,600	1.344	578,000	125,589,900
July	497,800	81,250,700	36.9	109,795,700	1.351	585,100	137,988,900
Aug.	508,700	86,790,600	38.5	116,851,100	1.346	595,600	145,226,300
Sept.	508,600	81,639,800	37.5	111,158,000	1.362	595,700	139,625,600
Oct.	508,300	90,858,000	40.3	121,842,000	1.341	595,700	150,637,500
Nov.	514,600	83,824,500	38.0	114,572,500	1.367	600,000	143,440,700
Dec.	506,000	79,864,700	35.7	107,963,200	1.352	594,200	137,216,500
Total	490,000	896,679,000	35.1	1,208,259,000	1.347	575,300	1,544,142,000
1945	469,800	1,082,529,000	44.2	1,351,461,600	1.248	551,200	1,645,332,700
1944	488,900	1,193,025,300	46.7	1,454,254,000	1.219	571,200	1,745,019,700
1943	540,300	1,210,328,800	43.0	1,374,078,700	1.135	625,700	1,649,227,000
1942	567,900	1,153,298,300	38.9	1,218,203,200	1.056	647,200	1,467,058,700
1941	562,800	1,132,212,100	38.6	1,085,541,100	.959	633,000	1,301,347,800
1940	485,200	918,482,600	36.2	780,922,200	.850	546,800	960,779,300

increase of 12½ cents an hour in the basic wage rates, the granting of certain other benefits and the correction of wage inequities, which resulted in retroactive increases for about one-third of the steelworkers prior to April.

On the basis of total wages and salaries of $1,459,742,000 paid out during the first nine months, total steel payrolls last year were in excess of $1,946,000,000, surpassing even the war record of $1,745,019,700 in 1944, and comparing with $960,779,300 in 1940. In September last year the hourly wage rate paid to steelworkers set a record at $1.571. Further comparisons are shown in accompanying table.

Earnings Up—While production was up in the last quarter to the highest level of the year, higher wage and material costs, the latter reflecting in part the 10 per cent increase in freight rates, effective Oct. 13, kept net earnings to around the level of the second or third quarters, some trade leaders believe. In the third quarter net earnings of steel producers, representing 86.9 per cent of the ingot capacity of the industry, amounted to approximately $85,800,000; and in the second quarter, $87,000,000. General opinion is that fourth quarter earnings did not approach those for first quarter, which amounted to $115,300,000.

Pig Iron Shortage Hits Foundries—Foundries, as well as steel mills, face restricted production for some time because of shortage of pig iron and scrap. Actually, in the opinion of one authority, merchant iron supply and demand are not far from being in balance. Add three furnaces of moderate size to current production, and balance would be close to being achieved. One merchant furnace at Gadsden, Ala., is expected in production early in the second quarter after having long been down, thus leaving two of good or medium size still needed. Or a balance might be closely struck if coking coal were of uniform high quality, thus eliminating the loss of 10 to 12 per cent in production now being experienced.

So it is a case of being yet so near and yet so far—but with adjustment eventually in prospect. In addition to greater iron production and improved processing of fuel, this adjustment should be expedited later by an easing in scrap, although time will be required.

Allocations Cause Dislocations—Over past months allocation of pig iron under the housing program has caused considerable dislocation of tonnage. With the expiration of controls of the housing expediter scheduled to end at this time, many foundries should benefit, although probably not to the extent they anticipate, for there will be a housing shortage for possibly several years and a public demand for all-out housing relief if requirements are not maintained.

The termination of these controls, and end to government subsidies, may result in some furnaces going down for long needed repairs, so there may not be the early relief anticipated by various foundries for this reason if for no other. Further, with government bonuses ended, merchant furnaces may deem it advisable to increase prices.

Despite various handicaps, gray iron foundries in the year just ended achieved a new all-time high of approximately 13 million tons, according to leading estimates. Foundry production in general is currently estimated at more than 130 per cent above 1939 levels. In 1947, merchant furnaces rounded out the year with foundry and malleable iron for sale estimated at about 5,100,000 tons, the highest in more than 10 years. In the last full prewar year, 1940, production for sale of foundry and malleable grades totaled 3,781,635 tons. Merchant furnaces also supplied semi-integrated steel companies with 20 per cent more bessemer, basic and low phosphorous iron than they did in 1940.

NONFERROUS

1948 Needs T

By F. R. BRIGGS
Associate Editor, STEEL

STOCKPILING activity of the government and impact of the proposed Marshall Plan for aid to Europe will be the most important factors affecting the nonferrous metals industry in 1948. Supplies available to metalworking in the year just closed were substantially larger than in 1946, but a relatively tight situation developed late in the year, especially in copper and lead.

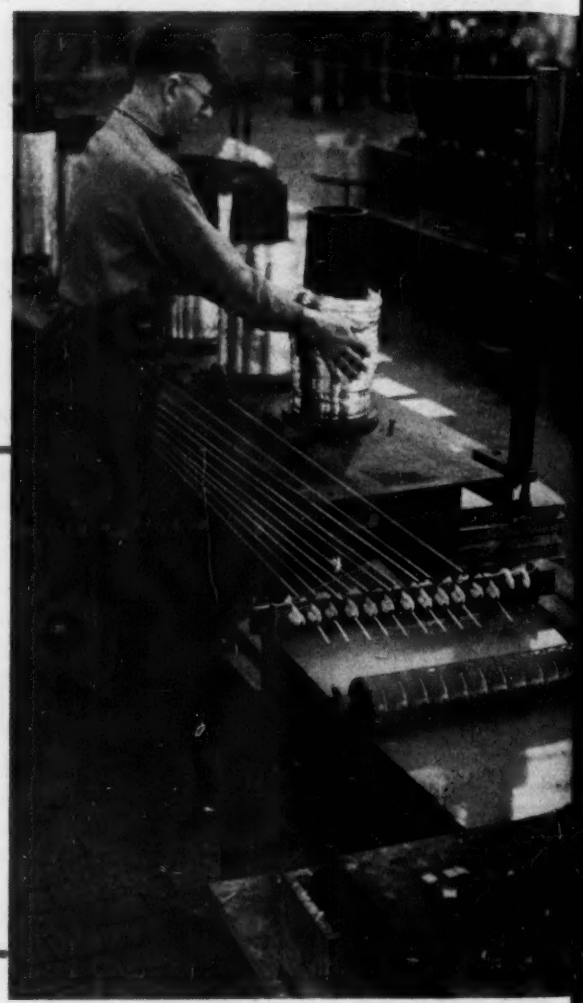
Domestic production of metals and metal products is running at a peacetime high. If current high levels of business continue, domestic and export demands will require maximum domestic production and substantial imports of most nonferrous metals. Under the Marshall Plan, however, additional exports of refined metals or metal products would lead to further imports of raw materials.

Facilities Adequate — The United States has capacity for smelting and refining nonferrous ores greatly in excess of domestic mine output and is thus able to treat larger quantities of foreign ores, if necessary. The nonferrous metal fabricating facilities of the nation also exceed normal domestic requirements, having been greatly expanded during the war. Thus, there is ample capacity available to meet a large increase in exports for foreign rehabilitation.

Additional manpower would be required to maintain mine production at the required high rate, but this presents a relatively minor problem since the deficit in output could be offset by larger imports. "It is evident that for most of the metals," J. A. Krug, secretary of the interior, said in making a report on this subject, "the nation's own resources could not support large shipments to foreign countries at this time. But neither can they support the requirements of a domestic economy operating at high levels of production.

"Foreign resources are available for most metals needed in both a high level domestic economy and a foreign aid program. The quantities of antimony, cadmium and lead in sight for the next few years are short of world requirements, but they are sufficient for essential needs. Tin also is exceedingly scarce, but ample supplies are expected by 1950.

"Foreign sources, likewise, must be utilized to meet current domestic needs as well as expanded exports of products requiring aluminum, chromium, copper, manganese, mercury, nickel, tungsten and zinc. Under foreseeable conditions these resources will continue to be available in adequate quantities. Additional needs for magnesium, molybdenum, and vanadium probably would be obtained from sources within the United States, but the quantities likely to be shipped abroad are small compared with total domestic consumption and reserves. Consequently, a sizable increase in exports of goods from the United States for a rehabilitation program would not cause significant depletion of domestic metal resources.



Delay Stockpiling—"The diversion of world production to current use will delay the stockpile procurement program of the United States that was inaugurated as a national defense measure. In view of the rapid rate at which known domestic metal reserves are being depleted, this point emphasizes the need for considering the advisability of future shipments of foreign minerals to the United States in partial repayment of aid extended in the foreign rehabilitation program."

According to a report prepared for the Committee on Foreign Aid, the estimated values, based on current prices, of strategic minerals that may be available annually for stockpiling purposes from coun-

S METALS

ds T quire Maximum Output

Large tonnages for government stockpiling and exports will be superimposed on expected heavy domestic consumer needs. Stocks of most major nonferrous metals declined last year despite gains in production

PROTECTIVE COATING: Tinning and galvanizing fine wire is performed on units of this type in American Steel & Wire Co.'s South Works, Worcester, Mass. Photo shows 10 wires leaving a bath of molten metal (either zinc or tin) in the foreground and passing through a water rinse before going onto the take-up blocks. Use of these metals as protective coatings accounts for consumption of large tonnages of zinc and tin

tries participating in the Marshall Plan are tabulated on page 132.

The House Select (Herter) Committee on Foreign Aid estimated annual receipts and values of the following metals which the United States might receive annually for a 20-year period as partial payment for aid to Europe as follows: Copper, 70,000 net tons, valued at $21 million, on basis of an estimated average price of 15c per pound over a 20-year period; lead, 75,000 tons, valued at $15 million at an average price of 10c; zinc metal, 20,000 tons, valued at $3,200,000 at an average price of 8c; zinc ore, 50,000 tons of recoverable zinc, valued at $4,600,000, at an average price of $40 per ton of ore; tin, 42,500 tons, valued at $46,750,000, at an average price of 55c per pound.

The Bureau of Federal Supply, Washington, has offered to purchase copper, lead and zinc for the permanent stockpile, but only the zinc industry was in a position last year to offer metal for such reserves. The requirement that at least three regular consumers be offered the metal supplies before the metal became eligible for sale to the government precluded any stockpile purchases of copper and lead in 1947.

Metals Reserves Stocks—In additon to the permanent stockpile, the Office of Metals Reserve, subsidiary of Reconstruction Finance Corp., holds stocks of various metals which are available for sale under certain conditions. As last reported, stocks included 11,040 tons of copper, 1300 tons of lead, 35,015 tons of zinc, 6558 tons of antimony and 20,542 tons of tin.

OMR stocks constituted an important source of supply during 1947 for consumers who were unable to satisfy their needs through their regular suppliers. These stocks have been reduced to such a low level that they will not be an important source of supply in 1948. As a matter of fact, lead users were unable to purchase much metal from OMR during fourth quarter. A large part of the reduction in zinc stocks last year was due to transfer of substantial tonnages from OMR stocks to the permanent stockpile. Withdrawal of over 130,000 tons from the open market is a definite indication that supplies of this metal are available for all domestic requirements. The withdrawal of these stocks also tended to firm the price undertone of the market at the 10.50-cent level for prime western, delivered East St. Louis, which held unchanged throughout 1947.

Zinc needs are expected to remain at about 800,000 tons per year through the next five years to be met by a slowly declining production from domestic mines and increasing imports. There is a war-accumulated stockpile of foreign concentrates in the United States containing some 300,000 tons of recoverable zinc. These form an insurance against minor interruptions to the flow of domestic mine production or imports. Domestic slab zinc stocks dropped to only about 70,000 tons last year, the lowest since 1942, compared with 175,800 at the end of 1946. Production rose to a new peacetime high of about 847,000 tons, having been exceeded only during the 1941-44 war period. This compared with 759,346 tons in 1946. Total shipments (including export, drawback and tonnages earmarked for government account) increased to an all-time high of about 953,500 tons, compared with 842,937 tons in 1946 and 887,638 tons in 1943, the wartime high. Stocks of slab zinc at the yearend totaled about 70,000 tons compared with 175,800 at the end of 1946 and 259,391 tons at the end of 1945. The statistical record for the industry in the last ten years is shown on page 132.

Largely a By-Product — Recovery of cadmium is largely a by-product of the smelting of zinc concentrates and in 1947 was not sufficiently large to meet domestic needs.

Although production of copper increased last year to around 1,200,000 tons, a peacetime high and close to the wartime peak of 1,206,871 tons established in 1943, supplies tended to tighten during the fourth quarter of last year. While deliveries increased to about 1,400,000 tons from 1,261,830 tons in 1946,

PROPOSED U. S. STOCKPILING UNDER MARSHALL PLAN

(000 omitted)

	United Kingdom	Nether-lands	Belgium	France	Others	Total
Bauxite	$6,000	$14,400	.....	$2,400	.....	$22,800
Chromite	4,150	.....	.....	400	$1,600	6,150
Cobalt	1,500	.....	$1,500	.....	.....	3,000
Columbite	670	.....	.....	.....	.....	670
Copper	20,000	.....	8,000	.....	4,000	32,000
Lead	16,550	.....	.....	7,500	.....	24,050
Manganese	7,850	.....	.....	240	.....	8,090
Nickel	.....	.....	.....	875	.....	875
Tin	51,200	34,200	3,400	.....	.....	88,800
Tungsten	.....	.....	.....	.....	4,500	4,500
Zinc	8,000	.....	.....	.....	.....	8,000
Minerals*	3,892	.....	20,240	134	.....	24,266
Total	$119,812	$48,600	$33,140	$11,549	$10,100	$223,201
Purchases†	3,135	7,300	6,072	100	600	17,207

* Including asbestos, corundum, industrial diamonds, graphite, mica and tantalite.

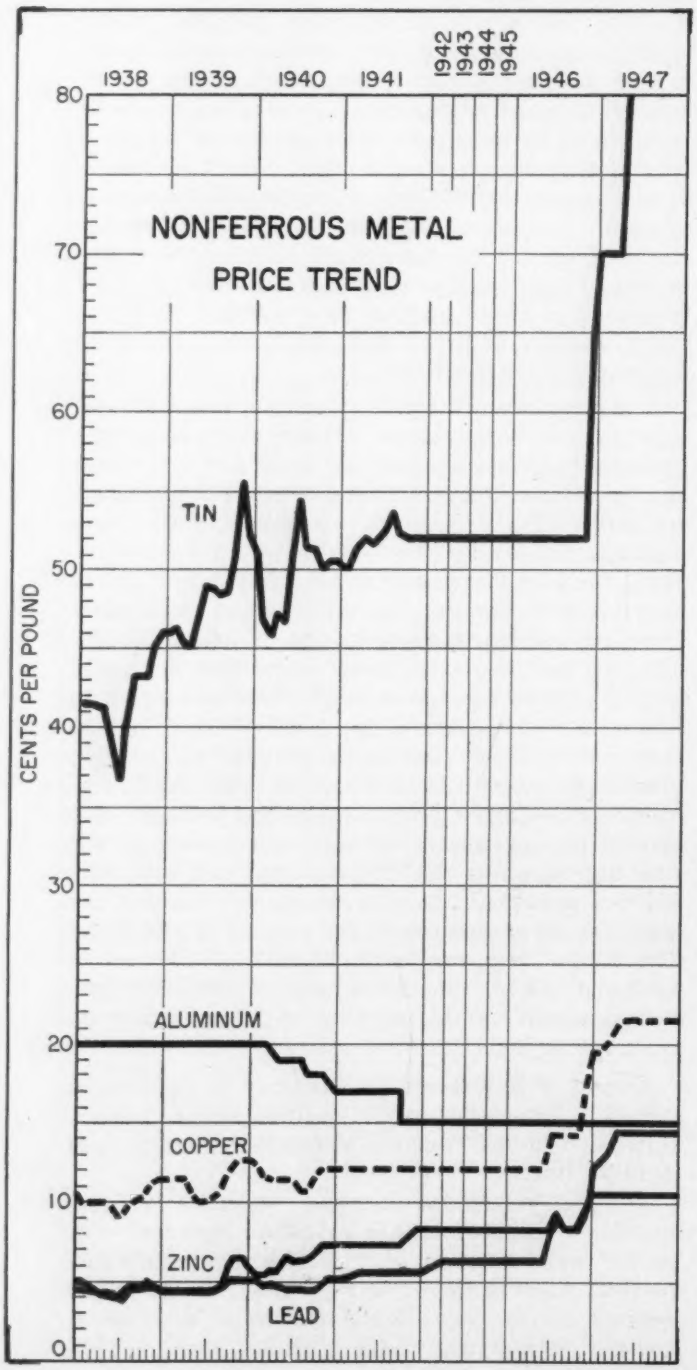
† Present annual stockpile purchases.

U. S. SLAB ZINC STATISTICS

(Net tons)

	Production	Shipments			Unfilled Orders	Stocks at End
		Domestic	Export	Total		
1947*	845,000	826,500†	113,000	939,500	50,000	81,300
1946	759,346	776,299‡	66,638	842,937	58,057	175,800
1945	799,520	768,227**	9,422	777,649	27,092	259,391
1944	901,332	830,334	6,988	837,322	21,332	237,520
1943	971,873	831,430	56,208	887,638	44,914	173,510
1942	929,770	733,918	151,650	885,568	52,752	68,268
1941	863,955	751,276	106,195	857,471	87,666	24,066
1940	706,100	674,615	88,165	762,780	125,132	17,582
1939	538,198	598,972	.....	598,972	53,751	65,995
1938	456,990	395,534	20	395,554	40,829	126,769

* Estimated. † Including 60,000 tons on government account. ‡ Including 62,007 tons on government account. ** Including 5302 tons on government account.



stocks dropped to about 70,000 tons. With stocks equivalent to less than three weeks' needs at the 1947 rate of deliveries, any prolonged interruption in the flow of metal in trade channels early in 1948 would bring back the acute shortages experienced in 1946 and early 1947. In the latter year, however, consumers drew heavily on OMR stocks which totaled 155,000 tons at the beginning of the year compared with only about 11,000 tons now. A ten-year statistical record for the industry is shown on page 133.

Based on estimates made by the government, output of copper from United States mines, 1947-1952, at current or somewhat lower prices, is expected roughly to fall short of the expected needs of the domestic industry in that period by about 1 million short tons. Large imports are required to make up deficiencies as well as to support a well established foreign trade. At present, a substantial copper source for meeting world needs lay unutilized in foreign mines now operating at two-thirds of capacity.

President Truman signed the bill to suspend the 4-cent import duty on copper until Mar. 31, 1949, effective as of Apr. 30, 1947. Soon thereafter the world price level was stabilized at 21.50c, delivered Connecticut Valley. The average for the year was 21.215c compared with 14.043c for 1946 and 12.000c for the 1941-1945 period.

Encourage Substitution—"Continuation of the present copper-aluminum price relationship will encourage a larger scale substitution of aluminum for copper," Mr. Krug said. "Copper prices passed those for aluminum in November, 1946, and are now about six cents a pound higher."

Due to attainment of the most favorable price position ever enjoyed by the aluminum industry, substitution of this metal for scarce materials, especially steel, caused apparent consumption to rise to a new peacetime high of about 525,000 net tons. At the same time, production increased to about 575,000 net tons. These totals were well below the wartime peak, but represent larger utilization of the war-expanded industry than had been anticipated. Privately-owned and leased primary aluminum capacity in the United States of 650,000 net tons annually is in excess of current consumption. In addition there is high-cost government-owned capacity (currently idle)

REFINED COPPER STATISTICS

(Net tons, as reported by Copper Institute Inc.)

	Production	Deliveries	Stocks
1947.....	1,200,000*	1,400,000*	70,000*
1946.....	604,071	1,261,830	80,832
1945.....	843,113	1,517,842	76,512
1944.....	1,098,788	1,636,295	66,780
1943.....	1,206,871	1,643,677	52,121
1942.....	1,135,708	1,635,236	65,309
1941.....	1,065,667	1,545,848	75,564
1940.....	1,033,710	1,001,886	142,772
1939.....	818,289	814,407	159,485
1938.....	638,076	481,303	289,755

* Estimated by STEEL.

ALUMINUM

(Net Tons; U. S. Bureau of Mines)

	Primary		Secondary
Year	Production	Apparent Consumption	Production
1947 ..	575,000*	525,000*	150,000*
1946 ..	409,630	461,877	203,976
1945 ..	495,060	797,220	298,387
1944 ..	776,446	744,627	325,645
1943 ..	920,179	877,349	313,961
1942 ..	521,106	588,969	196,464
1941 ..	309,067	302,788	106,857
1940 ..	206,280	227,017	80,362
1939 ..	163,545	167,646	53,947
1938 ..	143,441	89,523	38,800

* Estimated by STEEL.

U. S. REFINED LEAD STATISTICS

	Production	Domestic Shipments	Stocks At End
1947	576,900*	600,000*	25,000*
1946	413,903	411,433	48,088
1945	524,328	500,003	43,476
1944	538,618	552,063	19,536
1943	546,673	548,417	33,090
1942	633,818	618,947	34,937
1941	634,888	655,542	20,185
1940	585,480	603,143	40,926
1939	497,991	555,074	58,777
1938	408,539	421,625	115,902

* Estimated.

of 230,000 tons which could be put into production provided sufficient electrical power were available and world demand justified it. Domestic aluminum fabrication facilities are capable of working the total potential primary aluminum production. However, late last year Aluminum Co. of America suspended acceptance of orders for sheets until early in 1948, the company's capacity having been fully booked for the first quarter. The statistical record for the industry for the last ten years is shown above.

Draw on Stocks—While aluminum ingot supply situation was easy, lead supplies were progressively tight in the second half of last year. The deficit between production and consumption of lead during 1947 was met by drawing on stocks and importing foreign metal. Domestic production increased last year to about 576,900 tons from 413,903 tons in 1946 while domestic shipments increased to approximately 600,000 tons from 411,433 tons in 1946. This resulted in a drop in stocks to only about 25,000 tons, the lowest since 1941, compared with 48,088 tons at the end of 1946. In the face of heavy and increasing demands for lead from other parts of the world, foreign supplies are not adequate to meet the entire anticipated shortage in 1948. Production, shipments and stocks of refined lead reported at the end of each year since 1937 are shown above.

Outlook for a substantial increase in world output in the near future is unfavorable because reserves are seriously depleted and current production rates represent near capacity levels. "Consequently, it is clear that consumption will be curtailed," Mr. Krug said, "either by economic forces or by domestic or international government controls. Any rehabilitation program placing heavy drains on lead supplies would reduce further the ability of the American industry to meet domestic consumer and present export demands for end-products."

Although production of pig tin in the United States was on a reduced scale in 1947, due to reduced supplies of the better grades of concentrates, the overall supply was larger. Importations of pig tin from Africa and the Far East increased and still larger receipts are expected in 1948.

Supplies of all primary and secondary tin available to the United States totaled about 84,500 tons in 1947 and will increase to about 91,000 tons in 1948. Allocations of primary tin during the first nine months of 1947 totaled 46,222 tons. Stocks in the hands of OMR as of Dec. 31, 1947, are estimated at about 20,000 tons.

Control Extension—Due to the fact that supplies are far short of unrestricted requirements and will continue so for at least two years, controls covering allocations and distribution of tin and tin products probably will be extended beyond the present expiration date of Feb. 29, 1948, to assure that minimum requirements are met for such essential end-uses as preservation of perishable food. An increase in the price for tin on Dec. 19 to 94.00c from the 80-cent level, which had held unchanged from Apr. 1, 1947, was announced by OMR.

Imports of foreign ore for treatment at the Longhorn smelter in Texas should rise in 1948 above the estimated 30,000-ton total for 1947.

In addition to maintaining controls over tin, the government also regulates the distribution of antimony. This metal is still in short supply and the outlook for major improvement in the immediate future is not favorable, unless China re-enters international trade and resumes its position as chief world supplier. New supplies in 1948 are estimated at 22,800 short tons. Domestic requirements against this supply are expected to total about 40,000 tons.

In Unique Position—Among the metals, magnesium holds a unique position because domestic production and fabrication capacity vastly exceeds current needs. The rated capacity of domestic sea-water plants is 54,000 net tons yearly which is substantially in excess of prewar world output.

Imports of mercury and nickel are available in large supply and will satisfy all domestic needs fully.

New tariffs, to become effective Jan. 1, which are a part of an agreement between the United States and 22 other countries concluded at Geneva last October, cover various forms of antimony, aluminum, bauxite, cadmium, chromium, copper, magnesium, manganese, nickel, tungsten and zinc.

As a direct result of the reduction in the United States import duty on refined nickel, the International Nickel Co. Inc. reduced its price of the metal 1.25 cents a pound, effective as of Jan. 1, 1948.

By B. K. PRICE
Eastern Editor, STEEL

DISTRIBUTION

Development of more efficient system for channeling steel and finished products as well as other materials from production to consuming points is one of 1948's major problems

DEVELOPMENT of equitable and more efficient distribution of production constitutes one of the major problems facing manufacturers as the new year opens. One phase of the problem is the allocation of supplies so as to bring about a better balance of inventories; to get the right amount of raw materials to the proper places of consumption at the right time.

Tonnages of steel flowing in the "gray" market represent what might be called "displaced" tonnages and could serve the economy of the country to much better advantage were they handled in the normal distribution system.

The scramble for steel items in short supply has been highlighted by gray market operations the past year. These latter probably have not involved a large tonnage in the aggregate (one steel leader estimates that not more than 2 million tons were involved), but they have been spectacular price-wise, and the subject of much trade discussion and Congressional interest.

Shortages Persist—Shortages of materials and components persisted throughout the year, despite an increase in production of many items to peacetime highs, hampering operations in many manufacturing industries. For instance, as late as December a leading truck manufacturer was receiving certain screws in 100 to 300 lots from agents who acquired them through retail channels. This uneconomical practice was necessary to supplement supplies received from regular sources in order to keep trucks rolling from the factory.

Manufacturers and distributors, realizing the vital need for an enlarged distribution system, are developing a program aimed at keeping their activities in step with the expanding economy. Two organizations, the American Supply & Machinery Manufacturers Association Inc. and the National Supply & Machinery Distributors' Association, were especially active last year in that field and plan to extend their efforts vigorously along this line in 1948. They are formulating policies which they hope will lead to a freer flow of goods into consuming channels, lower distribution costs and larger volume of sales.

No matter how well the plans of these or other interests are formulated, however, they may be disrupted by a shortage of transportation facilities, by the siphoning off of supplies by government-directed shipments to Europe under the Marshall Plan, by labor disputes, or many other factors beyond distributors' and manufacturers' control.

System To Benefit—The overall distribution system will benefit greatly if the freight car construction program can reach its projected goal by July. In many instances in 1947, supplies at the point of production were adequate but were delayed in reaching points of consumption by the shortage of transportation facilities. Availability of manpower to move goods, as well as to make them, is also an important factor in the distribution system and is expected to continue tight as long as industrial activity holds at present high levels.

Insofar as steel is concerned, prospects indicate an improvement in supply as the new year advances, although shortages will still be evident. This year should see the heaviest expansion in steelmaking facilities since the war; an expansion delayed earlier by industry-wide labor disruptions and slow deliveries in equipment. While stringency in pig iron and scrap will continue to retard actual production for some time, a gain of at least 1 million tons should materialize in 1948.

Meanwhile, supply of consumer products is making some headway. At least some pipelines are filling up; and long delays in delivery of various consumer-durable items are becoming more the exception than the rule. However, prospects for steel demand continue bright, with requirements apparently more than sufficient to absorb available supply, especially in light flat products, plates, pipe, small-sized hot-rolled carbon bars and certain wire products. In addition to strong domestic demand, the proposed Marshall Plan may add at least indirectly to the pressure on steel by virtue of requirements for machinery and equipment to be sent abroad, if not by a direct increase in the export of steel.

The task confronting steel sellers is increased by the fact that they still have not only to catch up with the needs of their regular customers, many of whom have substantially expanded their facilities, but to handle as best they can the requirements of many additional metalworking consumers who have

Vertical "A" racks, a section of which is shown at right holding stainless steel bars in the Primos, Pa., warehouse of Crucible Steel Co. of America, accomplishes space saving and efficiency in warehousing long steel bars. Handling of stocks in these racks is done entirely with overhead crane. Racks are anchored to concrete floor, leaving overhead space clear for crane operations

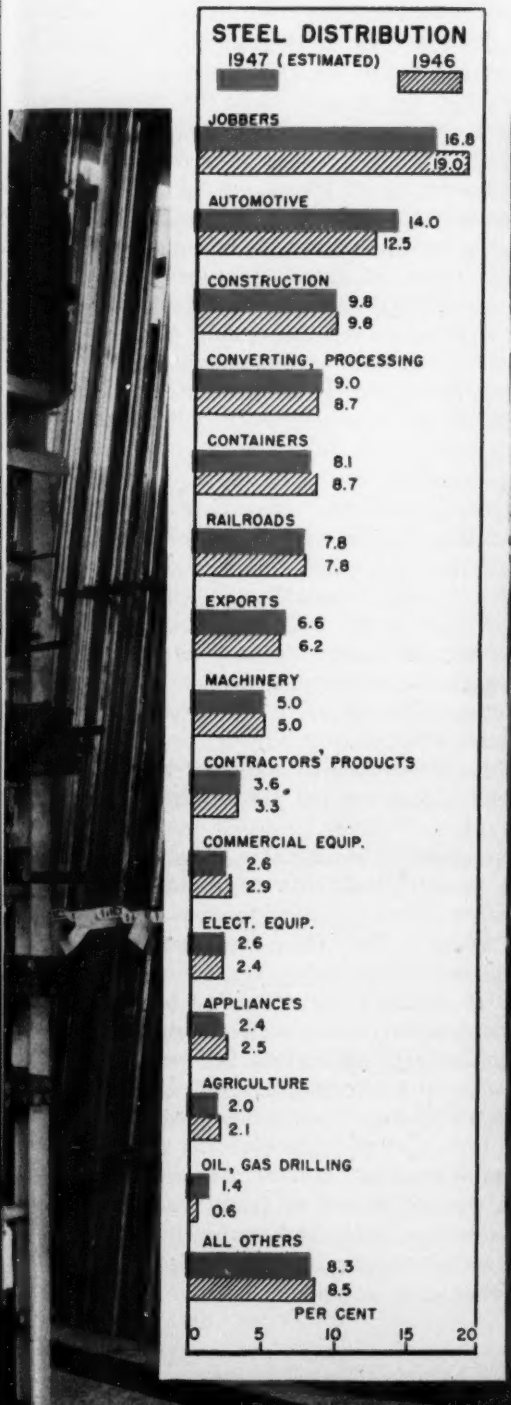
entered the field in recent years. From 1939 to 1946, inclusive, the number of steel consumers increased from 20,400 to 33,600 or 64.7 per cent. During the same period, manufacturers of electrical equipment increased their capacity by almost 93 per cent; machine tool builders, 80 per cent; transportation equipment manufacturers, 75 per cent; and makers of fabricated metal products, 66 per cent.

Mad Scramble—This situation, combined with postwar delays in projected steel expansion and disruptions to existing production through major strikes in steel and coal, has given rise to the mad scramble for steel over the past many months. This scramble has been highlighted by acquisition of scattered steel facilities by some large consumers, especially of sheets and strip, and even by syndicates of small consumers, thereby countering in some respect a trend in the steel producing field to extend end-product manufacturing.

Contributing to the trials of many metal consumers has been the withdrawal or partial withdrawal of various mills from remote areas, because of high freight absorption and the ability of some of these interests to dispose of steel at points nearer home. Now with another substantial freight rate boost possible before the end of this quarter, a still further withdrawal by some mills may result.

Meanwhile, recent administration proposals for government control on steel distribution, even though of "limited" or "temporary" nature, have tended to disturb consumers—as well as producers—but time appears to be working against these proposals, along with the government proposal for a return to price control.

Few shifts have occurred recently in the major steel distribution pattern. In fact, in the year just ended in the 14 principal groups only four classifications were affected, as compared with the preceding year. The converting and processing group was fourth, compared with fifth in 1946, the shift being at the expense of containers; and electric machinery

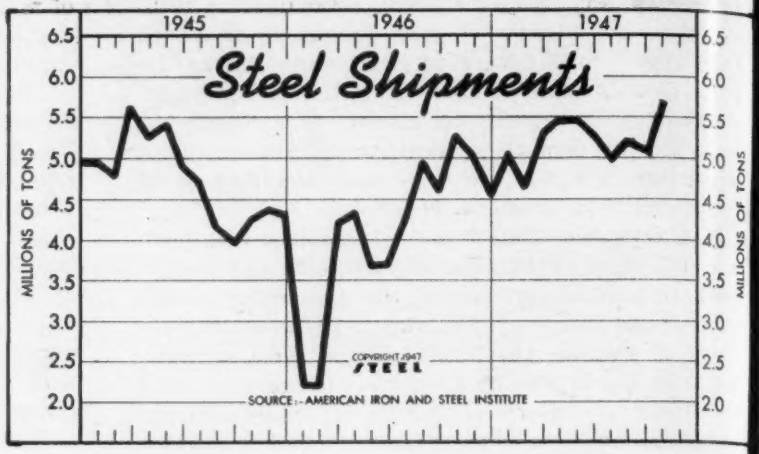


Steel Shipments

(Net Tons)

	1947	1946	1945
Jan.	5,061,333	2,189,369*	4,940,160
Feb.	4,626,424	2,189,368*	4,776,377
Mar.	5,304,415	4,213,913	5,632,155
Apr.	5,445,993	4,335,694	5,254,064
May	5,442,343	3,666,677	5,417,051
June	5,263,711	3,687,509	4,891,228
July	4,974,566	4,259,494	4,696,895
Aug.	5,278,223	4,965,456	4,123,578
Sept. ...	5,118,839	4,589,902	3,955,198
Oct.	5,681,597	5,260,832	4,267,177
Nov.	.....	5,019,984	4,366,567
Dec.	.....	4,533,420	4,297,502

* Figures for January and February, 1946, are merely averages derived from a report that combined shipments for those two strike-affected months into a total of 4,378,737.



and equipment was twelfth, compared with thirteenth, changing position with appliances, utensils and cutlery.

Consistent with the postwar pattern to date, jobbers, dealers and distributors received more steel than any other one group. Based on a projection of figures for the first nine months, as supplied by the American Iron & Steel Institute, and taking into consideration the fourth-quarter increase in activity, this group received approximately 10,500,000 tons, against 9,304,817 tons, an increase of almost 1,200,000 tons. Based on a similar projection, other leading groups also gained substantially in tonnage.

Despite ability to consume considerably more, manufacturers of automotive equipment, excepting tractors, received 8,750,000 tons, a gain of over 2,600,000 tons over 1946 and almost 6,600,000 over 1945, when major strikes affected the operations of both steel producing and consuming plants. In that earlier year the automotive industry ranked eleventh among the various consuming groups.

In Third Place — Construction and maintenance work was in third position, with 6,150,000 tons, against 4,767,703 tons in 1946, and converting and processing in fourth, with 5,650,000, against 4,239,471 tons. Container manufacturers in fifth position received 5,050,000 tons. However, as shipments of tin plate in the fourth quarter are usually the lightest of the year, this arbitrary figure may be subject to downward revision. In any event, though, total receipts for 1947 were appreciably greater than in 1946, when the total was 4,255,287 tons, and when this group ranked fourth, instead of fifth as indicated for 1947.

Question exists also with respect to the projected figure for railroad transportation, the next ranking group. In this case, the estimated figure of 4,850,000 tons for the year may very likely be on the low side, with a result that this classification might actually be ahead of the container classification; in other words, in fifth instead of sixth place. The reason is the increasing emphasis placed on rail transportation requirements, especially freight cars, as the year advanced. Fourth quarter shipments to carbuilders were probably the heaviest of the year, as shops approached the goal of 10,000 domestic freight cars per month, originally set for July 1 of that year. Now a new goal of 15,000 cars per month has been set for July of this year, and already steel allocations have been further increased, with the prospect that 1948 may see rail transportation ranked within the first three or four.

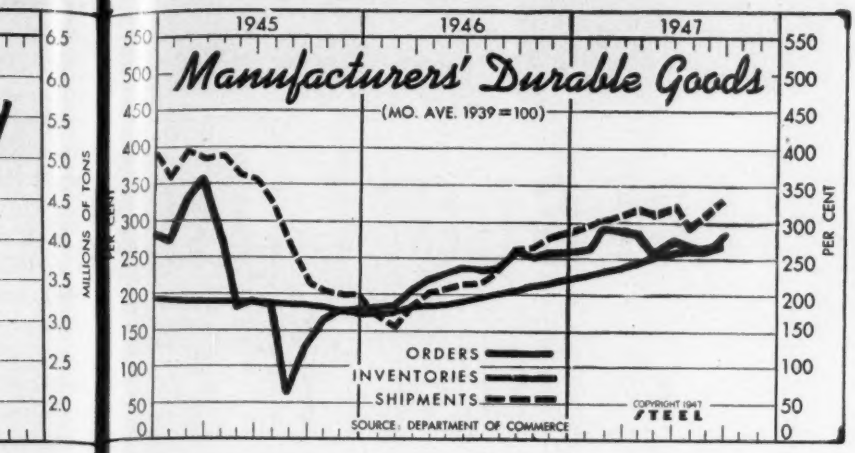
Exports took 4,100,000 tons, on the projected basis, against 3,026,771 tons in 1946 and 3,743,343 tons in 1945. Here the figure for 1947 appears to be on the high side, for the reason that the trend in steel exports was off throughout the greater part of the last half, due primarily to a change in the export licensing system as it affected most steel products, from consolidated to individual licensing.

Exports Slow Up — The change, specifically, was effective as of Oct. 1, but from the time it was announced around mid-summer, exports began to slow up and continued to lag throughout the last quarter as the new licenses came out slowly. However, the decline was cushioned by shipments of orders originally taken under the consolidated licensing system and which have until Feb. 1 to be completed. This year, and especially with the Marshall Plan coming up, the trend should be reversed, with steel exports at least sustained at the average for 1947.

As a further comment, export figures mentioned above refer to mill shipments. So while strongly indicative of the trend, they do not cover all steel shipments abroad. Last year, as true since the end of the war, government surplus steel was shipped overseas, although less than in the preceding year or so; and steel scheduled originally for other purposes was resold and shipped to foreign countries. Consequently the actual volume moved abroad was somewhat heavier.

Manufacturers of machinery, industrial equipment and tools ranked ninth with approximately 3,150,000 tons, against 2,415,517 tons in 1946. Interestingly, the 1945 figure of 2,425,657 tons, noted in the accompanying table, included electric machinery and equipment, which in that year amounted to about 820,000 tons. Subsequently this was classified separately, with shipments amounting in 1946 to 1,154,506 tons, and last year to 1,600,000 tons. Add this latter figure to the 3,150,000 tons mentioned above for a total of 4,750,000 tons, and the gain over the past three years in receipts of steel by manufacturers of all this equipment, as originally classified, is impressive.

The machinery, industrial equipment and tool classification as now set up includes equipment of general purpose character, equipment for the chemical indus-



Index of Manufacturers' Durable Goods

(Mo. Ave. 1939=100)

	Orders		Shipments		Inventories	
	1947	1946	1947	1946	1947	1946
Jan.	270	176	292	169	226	171
Feb.	295	179	311	153	232	174
Mar.	288	203	312	183	238	181
Apr.	279	219	320	203	244	182
May	256	224	313	207	251	184
June	270	231	323	212	254	189
July	260	229	287	216	256	195
Aug.	260	232	301	233	259	200
Sept.	287	254	332	259	263	206
Oct.	...	248	...	262	...	211
Nov.	...	254	...	278	...	215
Dec.	...	271	...	292	...	220
Ave.	...	227	...	222	...	194

try, construction lines, food processing, metal working and processing, pulp and paper, textiles and other special industrial purposes, tractors and hand tools.

Contractors' products retained tenth place, consuming an estimated 2,250,000 tons, up about 630,000 tons from the preceding year, and domestic and commercial equipment, not including appliances, utensils and cutlery, eleventh place, with 1,650,000 tons, an increase of about 250,000 tons. This group, incidentally, includes such manufactured items as toys, motorcycles, domestic and office furniture, professional and scientific equipment, license plates and so forth; and contractors' products, such items as air conditioning and ventilating equipment, builders' hardware, culverts and concrete pipe and plumbing and heating equipment.

More For Appliances—With the electric machinery and equipment group, mentioned above, in twelfth place, the appliance, utensils and cutlery group follows, with 1,500,000 tons, up nearly 275,000 tons from the preceding year. Under this classification comes cooking stoves and ranges, refrigerators, washing machines and ironers, and other household appliances, utensils and galvanized ware and cutlery and flatware.

Agricultural equipment and other farm requirements line up in fourteenth position, with 1,250,000 tons, against 1,030,335 tons in 1946 and 1,120,320 tons in 1945. A further gain is expected this year, especially in view of the probability that more agricultural equipment will be earmarked for Western Europe under the Marshall Plan.

Oil and gas drilling, in fifteenth position, took 900,000 tons, as compared with 316,366 tons in the previous year, and shipbuilding, an estimated 313,000 tons, a little higher than in 1946, when 283,803 tons were consumed. Figures for the two years are so close that it is difficult to say for sure, with returns for the closing months of last year lacking, which year really was the better. Certainly the trend last year in shipbuilding appeared at low ebb, to say nothing of prolonged strikes at several of the eastern yards.

Mining, quarrying and lumbering, in seventeenth place, consumed an estimated 283,000 tons, against 209,758 tons. Ordnance and military needs took 44,300 tons, on the basis of the rate of shipments during the first nine months, compared with 30,458 tons in

STEEL DISTRIBUTION TO LEADING GROUPS

	*1947	1946	1945
Jobbers, Dealers, Distributors	10,500,000	9,304,817	9,571,436
Automotive, Excl. Tractors	8,750,000	6,112,120	2,162,964
Construction and Maintenance	6,150,000	4,767,703	4,663,774
Converting and Process	5,650,000	4,239,471	5,504,000
Containers	5,050,000	4,255,287	4,332,692
Rail Transportation	4,850,000	3,806,746	5,121,197
Exports	4,100,000	3,026,771	3,793,343
Machinery, Industrial Equip. and Tools	3,150,000	2,415,517	†2,425,657
Contractors Products	2,250,000	1,618,739	.....
Domestic, Commercial Equipment (not including appliances, utensils, cutlery)	1,650,000	1,398,055	.....
Electric Machinery & Equipment	1,600,000	1,154,506	.....
Appliances, Utensils, Cutlery	1,500,000	1,227,154	.....
Agricultural	1,250,000	1,030,335	1,120,320
Oil, Gas Drilling	900,000	316,366	1,605,707
All Others	5,150,000	4,101,945	16,941,150

* Estimated. † Included electric machinery and equipment.

1946, and 5,508,761 tons in 1945, when they ranked second. Aircraft requirements continued at the bottom of the list, with an estimated 40,000 tons, against 28,465 tons in the preceding year and 301,194 tons in 1945. The unclassified group accounted for about 4,519,700 tons.

Of the products in most demand, sheets and strip, based on rate of shipments in the first nine months, accounted for approximately 18,000,000 tons; hot carbon bars, 9,400,000 tons; plates, 6,200,000 tons; pipe and tubing of all kinds, 5,960,000 tons; and shapes, 4,400,000 tons.

Auto Demand Leads—In the light flat products, the automotive industry continues to be by all odds the major buyer, while jobbers come second, with manufacturers of contractors products, containers, and appliances, utensils and cutlery following more or less in that order, among the principal consumers.

Distribution of hot carbon bars continues to be featured by wide diversity, with the converting and processing group taking the most tonnage, the automotive industry next and jobbers third. Machinery, industrial equipment and tool manufacturers probably fall fourth, although unclassified buyers consume a substantial amount and also agricultural implement makers.

Construction and maintenance work consumes the most plates, with railroads, jobbers, manufacturers of machinery and industrial equipment and the conversion and processing group following more or less in that order. As may be assumed, construction takes the major percentage of shapes, with jobbers and railroads and the unclassified group following.

Transportation Industries

Nation's transport taxed to meet needs of postwar economy. Railroads progressing on rehabilitation program. Automotive industry slashing through procurement difficulties. Aircraft manufacturing a sick industry. Shipbuilding near lowest point in 50 years

Railroads

WITH end of the war, American railroads had looked to the future with some assurance their requirements in rolling stock and track could be accommodated within reasonable time. Four years of war had taken a heavy toll of equipment and during the entire period shortages of materials and manpower had denied all but the most urgent improvement of facilities.

In the 28 months since hostilities ended, the railroads have made a good beginning in getting their rehabilitation programs into operation. Exceedingly high level of business activity, which has continued and aggravated demand for materials, particularly steel, has retarded delivery of new freight and passenger cars, locomotives, and replacement rails. A considerable amount of equipment is on order, but rapidly rising operating costs and declining revenues are serving as a warning that future purchases might undergo some limitation.

New Record Loading—Indications are that freight car loadings in 1947 established the highest volume in 17 years. Increase over 1946 was about 7.6 per cent and the year's total was approximately 45 million. Best previous to this was 45,877,974 in 1930.

Railroad passenger revenues last year declined from 1946 volume which had been aided by heavy postwar military travel.

Fact that freight rate increases have lagged behind rise in operational costs has caused some impairment of financial position, 32 Class I railroads failing to earn interest and rentals in the first nine months of 1947.

In the early part of 1946, the railroads petitioned the Interstate Commerce Commission for a freight rate increase of about 20 per cent to offset higher wage and operating costs and effective July 1 of that year ICC granted a 6 per cent interim boost. Following hearings, the commission finally approved a rate boost of 17.6 per cent, including the interim 6 per cent, to become effective Jan. 1, 1947.

Seek Further Increase — In 1947, the carriers sought a further freight rate increase of about 27 per cent. ICC granted an emergency increase of 8.9 per cent in October. Later the carriers amended their petition to bring total increase asked to 30 per cent.

The railroad matter attracting the most publicity last year was the disappointing failure of the freight car building program to achieve specified goal. Railroads and carbuilders claimed the steel industry failed to provide sufficient steel—accusations which were promptly denied. In September, 1946, Reconversion Director Steelman ordered CPA to provide steel sufficient for 7000 freight cars per month. In early 1947 a voluntary program was worked out which guaranteed enough steel for the 7000 cars starting April and 10,000 starting July. Late last year plans were under way to up the car program despite the unsatisfactory steel supply situation.

The number of new cars built last year was far below needs. The production record ran as follows: January 2982, February 2293, March 2883, April 4123, May 3929, June 5527, July 6879, August 5963, September 7597 and October 8364. Ten-month total was 49,540 cars, which augmented by an estimated 8800 in November and 10,000 in December would

By E. F. ROSS, A. H. ALLEN and B. K. PRICE
Associate Editors, STEEL

Diesel-electric locomotives are adding that "new look" to an increasing number of railroad trains. Of orders for 967 locomotives for Class 1 railroads, 918 are to be diesels and diesel-electrics, with only 45 to be the steam type

make the full year total about 68,000. Incidentally, September was the first month in 1947 that freight car installations exceeded retirements, the margin being 668 cars. Late last year steelmakers agreed to increase tonnage of steel for new freight cars to permit a building program of 15,000 a month by July, 1948.

Export Control Effected—One oft-heard complaint was that too much steel was going into cars for export. This was denied; nevertheless, effective June 30, 1947, the government placed freight cars under export control.

Class I railroads and railroad-owned private-controlled refrigerator car companies put 46,308 new freight cars in service in the first 10 months of 1947. This compared with 34,127 in the same period of 1946. The 7736 new freight cars installed in October was the largest for any month since April, 1942, when 10,478 were built.

By types, the installations in the first ten months of past year were 13,597 hoppers, including 1361 covered hoppers; 2728 gondolas; 4938 refrigerator; 977 flat; 500 stock; 351 miscellaneous freight cars; and 23,217 box cars, which included 20,269 plain and ventilated and 2,948 automobile.

Add New Locomotives — The railroads also put 676 new locomotives in service in the first ten months of 1947, of which 68 were steam, 2 were electric and 606 were diesel. New locomotives installed in the same period of 1946 totaled 425, of which 79 were steam and 346 were diesel.

During the first ten months of 1947, the carriers retired 60,486 freight cars, which compared with 51,056 removed from service in the corresponding period of 1946.

As of Nov. 1, 1947, all railroads and private carlines had 126,213 new freight cars on order.

Class I railroads also had 967 locomotives on order on Nov. 1, 1947, compared with 573 on the same day in 1946. The number for 1947 included 45 steam, 4 electric and 918 diesel, compared with 67 steam, 6 electric and 500 diesel the year before.

Car Awards Heavy — Domestic freight car awards in 10 months of 1947 numbered 109,283, a total which established the year as the best since the war.

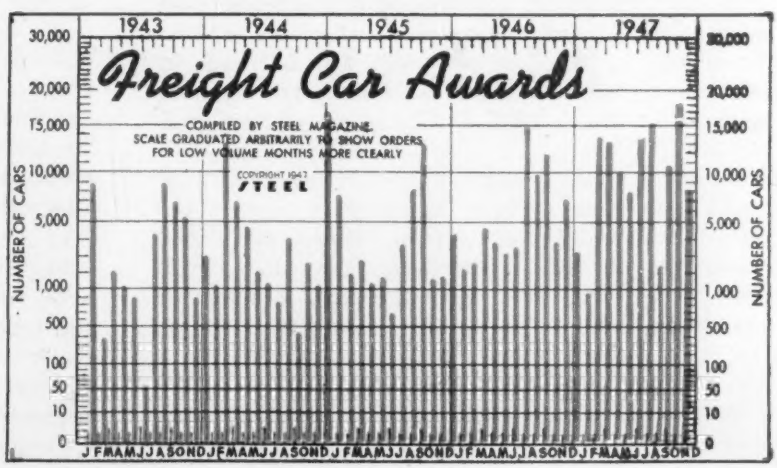
Only a moderate amount of new passenger equipment made its appearance on American railroads last year.

Aside from freight cars, the railroads did not get all the steel they desired last year. Like other consumers, they made the most of what was given them.

Freight Car Awards

	*1947	†*1946	1945	1944	1943
Jan.	9,172	1,481	7,200	1,020	8,365
Feb.	13,727	2,328	1,750	13,240	350
Mar.	12,049	3,512	2,500	6,510	1,935
Apr.	9,296	3,564	1,120	4,519	1,000
May	7,389	2,900	1,526	1,952	870
June	12,784	3,335	670	1,150	50
July	14,840	14,836	3,500	795	4,190
Aug.	2,372	9,527	7,240	3,900	8,747
Sept.	9,917	11,102	12,840	400	6,820
Oct.	17,737	3,407	1,320	2,425	5,258
Nov.	8,169	6,690	1,650	1,065	870
Dec.	.....	3,441	4,116	16,245	2,919
Total	.....	66,723	45,432	53,221	41,374

* American Railway Car Institute.
† Revised.

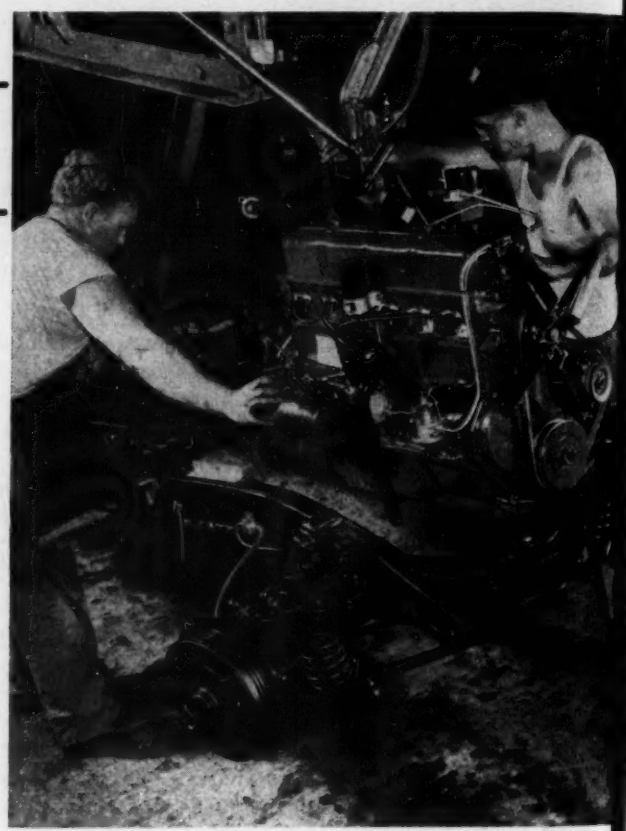

1943
1944
1945
1946
1947
Freight Car Awards
COMPILED BY STEEL MAGAZINE.
SCALE GRADUATED ARBITRARILY TO SHOW ORDERS FOR LOW VOLUME MONTHS MORE CLEARLY
COPYRIGHT 1947 STEEL
NUMBER OF CARS
30,000
20,000
15,000
10,000
5,000
1,000
500
100
50
10
0
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

Improvements, such as track replacements, new bridges, etc., were postponed for lack of steel. The carriers hope steel supply will be more adequate in 1948, but already there are evidences that it will not be. Overall demand for rails and track accessories exceeds capacity of mills to produce. Incidentally, as a point of technological progress, the railroads are using heavier rail sections today, which means that a given section of track requires more steel than formerly.

No Letup in 1948—In all probability, the railroads will want to buy more equipment and to do more construction in 1948 than materials will permit them to do. It will therefore be another year of battling shortages and limitations.

During 1947, airways and highway trucking assumed greater importance in mass transportation of freight, both industries adding to their stature in ton-miles carried and size of units making up the respective industries. Each year sees airplanes and trucks grow increasingly competitive with rail transportation, a situation which will continue. The time is not close, however, where significant transitions can occur and for years to come each form of transportation will thrive best in the special service to which it is adapted.

Automobiles



To help satisfy the great American desire to own an automobile, the auto industry in 1947 had one of its greatest production years, yet couldn't keep up with demand

SLASHING through a maze of procurement obstacles—nearly all of them involving flat-rolled steel —the automotive industry cleared 1947 in high gear to graze the 5 million mark, or possibly to top it a little, depending upon what the final tally will show a few weeks hence.

Thus the year will go down in records as the third, or no less than fourth, best in its half-century history. Car and truck output was 53.3 per cent ahead of 1946, only 2.1 per cent below 1941, practically identical with 1937, and 11.1 per cent behind the record 1929.

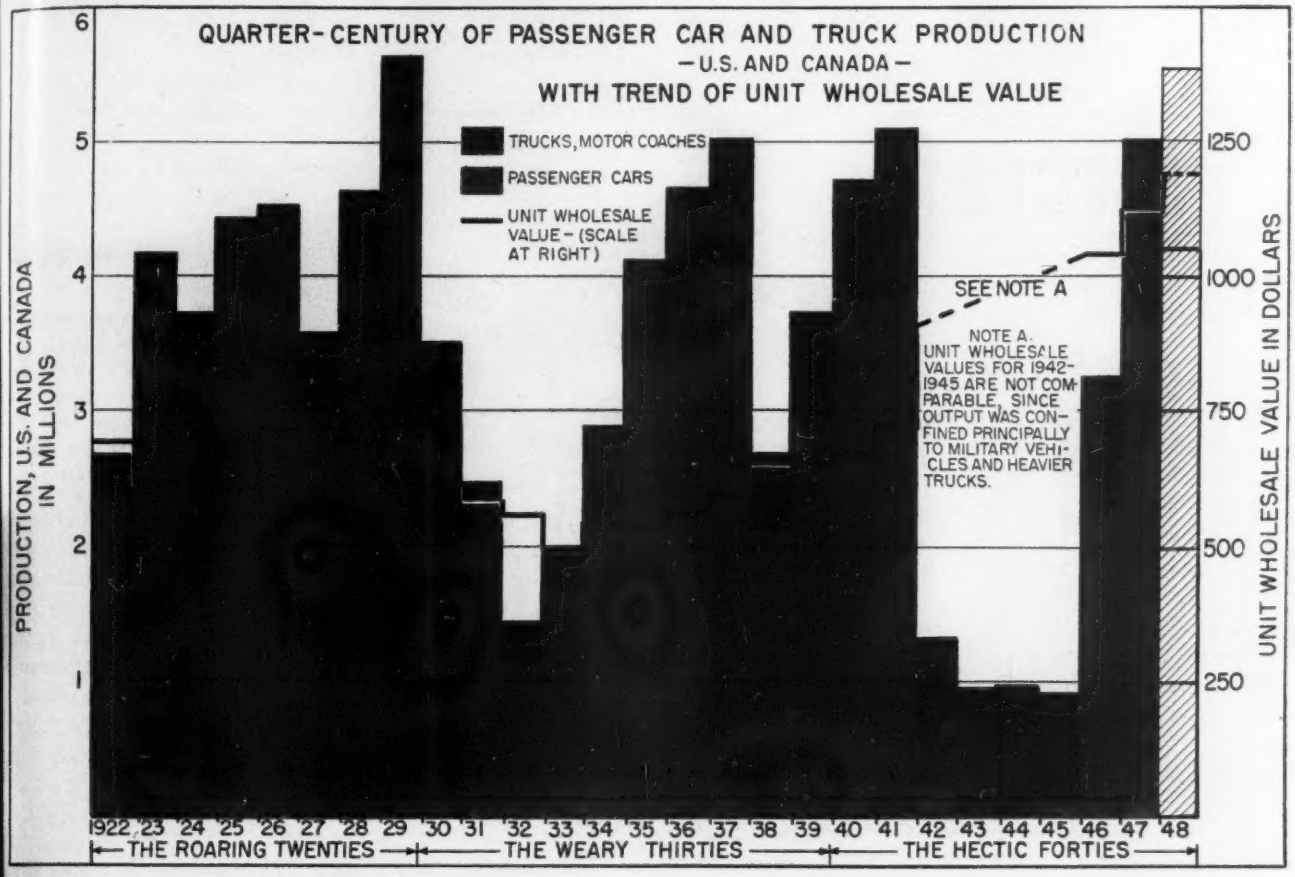
An accompanying bar chart depicts production over the past quarter-century, marks off the proportion of truck production and indicates the course of average unit wholesale values. To some historians and statisticians it hints the return of the widely accepted "cycle of threes" concept of automotive production. Going back to 1918, when the industry first really matured, production mounted from a plateau of around 950,000 for the succeeding two years, then relapsed in 1921 to a new base of about 1.7 million. Again output rose for two years and fell back in 1924 to another new base. The cycle was repeated after the decline in 1927, leading to the all-time peak of 1929.

Declining Cycle — After the great crash of that year, a declining cycle of three years may be observed, followed by a mounting three-year period culminating in 1935. Something of a hitch developed in the next cycle, when the flash recession of 1938 kicked auto output to a five-year low. However, the cycle-of-three resumed next year, clearing the 5 million mark for the third time in 1941.

The period of 1942-1945 must be removed from consideration, since all-out war effort erased any significance to production totals. However, in 1946, the cycle seems to have re-established itself, and is aiming for a new record high of around 5,500,000 this year.

In many ways, the record for 1947 eclipses the 1929 peak in terms of actual poundage of production. Note, for example, the high proportion of truck output, probably 75 per cent beyond the 1929 level. This, in part, accounts for the sharply higher average unit wholesale value of 1947, although inflated wages and costs must be assigned a major responsibility.

Employment Increased — Auto industry employ-


QUARTER-CENTURY OF PASSENGER CAR AND TRUCK PRODUCTION
—U.S. AND CANADA—
WITH TREND OF UNIT WHOLESALE VALUE
TRUCKS, MOTOR COACHES
PASSENGER CARS
UNIT WHOLESALE VALUE—(SCALE AT RIGHT)
SEE NOTE A
NOTE A. UNIT WHOLESALE VALUES FOR 1942-1945 ARE NOT COMPARABLE, SINCE OUTPUT WAS CONFINED PRINCIPALLY TO MILITARY VEHICLES AND HEAVIER TRUCKS.
PRODUCTION, U.S. AND CANADA IN MILLIONS
UNIT WHOLESALE VALUE IN DOLLARS
1 2 3 4 5 6
250 500 750 1000 1250
1922 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
THE ROARING TWENTIES
THE WEARY THIRTIES
THE HECTIC FORTIES

ment last year averaged 785,000 production workers and 175,000 salaried personnel, an increase of 17 per cent over 1946 and nearly 50 per cent above prewar levels. The question will immediately be asked: Why 50 per cent more employees and about the same production? The answer is thoroughly knotted up in such factors as replacement parts production, high truck and motor coach production requiring more man-hours per unit, production holdups because of material shortages, scattered and difficult-to-measure falling off in productivity. Wage levels, incidentally, are at an all-time high for the automotive industry, with factory payrolls last year estimated at $2.3 billion or 34 per cent above the previous year and 71 per cent beyond 1941.

Higher Scrappage Seen—Statistics show there have been something over 97.3 million passenger cars, trucks and busses built in the U. S. and Canada since the turn of the century, and perhaps 85 per cent of them in the past 25 years. Thus in the past quarter century there have been about 45 million vehicles scrapped, or an annual average of 1.8 million. Since scrappage in war years declined sharply in the absence of new production, the rate of retirement of old jalopies should have stepped up appreciably postwar, to the point where there must have been well over 2 million vehicles consigned to the junkyard in each of the past two years. As more new cars become available this year, and as the 1946 and 1947 models begin to turn over in the used car lots more frequently, still higher scrappage of earlier models seems assured.

An accompanying tabulation breaks down output for last year by makes, and attempts to project a similar breakdown for a 10 per cent expanded production for 1948. A few points should be kept in mind. First, it is believed unlikely truck production will go much beyond the record level of this year, some signs of softening already being noted. Increases, therefore, will be confined in the main to passenger cars. Second, all producers will not record proportionate gains.

CAR AND TRUCK PRODUCTION—WHAT'S BEHIND AND WHAT'S AHEAD

	1947*	1947 Per cent of Total	1948 (projected)[1]
†Chevrolet	1,025,000	20.5	1,130,000
Pontiac	220,000	4.4	255,000
Buick	265,000	5.3	295,000
Oldsmobile	189,000	3.8	210,000
Cadillac	56,000	1.1	65,000
GMC Truck & Coach	60,000	1.2	60,000
Total General Motors	1,815,000	36.3	2,015,000
Chrysler	105,000	2.1	120,000
†Dodge	390,000	7.8	420,000
DeSoto	80,000	1.6	85,000
Plymouth	345,000	6.9	400,000
Total Chrysler Corp.	920,000	18.4	1,025,000
†Ford	855,000	17.1	925,000
Mercury	126,000	2.5	140,000
Lincoln	28,000	0.6	35,000
Total Ford Motor Co.	1,009,000	20.2	1,100,000
†Studebaker	192,000	3.8	200,000
Kaiser-Frazer	145,000	2.9	245,000
†Willys-Overland	118,000	2.4	120,000
Nash	112,000	2.2	115,000
Hudson	105,000	2.1	140,000
Packard	55,000	1.1	75,000
†Crosley	22,000	0.4	15,000
Miscellaneous, including independent truck mfrs.	252,000	5.1	250,000
†Canadian assemblies	255,000	5.1	250,000
Total	5,000,000	100.0	5,550,000

* Preliminary since December production must be estimated.
[1] Calculated by STEEL on the basis of forecasts by industry leaders, outlook for materials and special conditions applying to individual producers.
† Includes trucks.

Aircraft

Like something from Mars, the Navy's new jet-rocket plane is designed to approach the speed of sound

MEASURED against 1944 production of over 96,000 planes—9113 in March alone of that year—aircraft manufacturing today is a sick industry. Output of military planes last year totaled a bare 1400, up only a fraction from the 1330 built in 1946, far below recommendations for a minimum postwar production level urged in 1945 by the government's Air Coordinating Committee. Of course, no one assumed there could be, or should be, a continuation of wartime production rate, but the postwar shrinkage has gone beyond what many authorities consider a safe minimum from a national defense standpoint.

Meanwhile, assembly of passenger and cargo transport planes has hit snags because of mounting costs, the conversion of hundreds of surplus military transports to commercial service, and extensive losses experienced by domestic trunk airlines. Net operating loss of 16 of these lines in the first quarter of last year was close to $19 million, compared with loss of $4.4 million in the same period of 1946. So the airlines have pulled in their belts on new equipment, even canceling some substantial orders already placed for new transports.

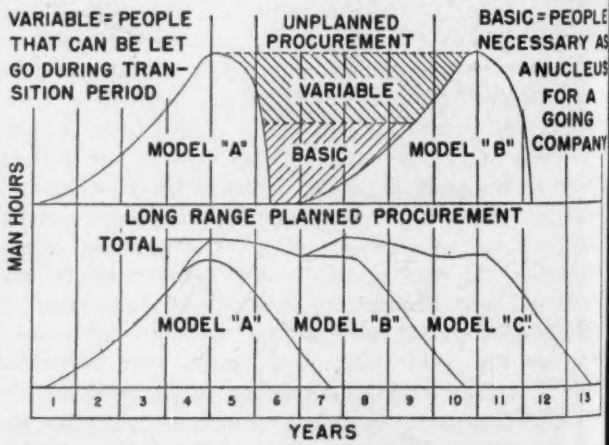
Heavy Financial Burdens—On top of this, the high cost of engineering, constructing, flight testing and service testing large new aircraft, together with the obviously low sales potential, create nearly insuperable financial burdens for both manufacturers and airlines. It is estimated, for example, that the development cost of an airplane similar in size to the largest transport now being offered for sale would amount to between $30 and $40 million for just the first plane.

The personal plane industry has recorded astonishing growth since 1933, when only 467 units were built, to 1946 when sales aggregated 35,000 plus another 30,000 from military surplus. The first seven months of last year saw production drop disappointingly to 11,695, still a creditable performance for this section of the industry, although relatively insignificant when stacked against the potential of builders of larger military and transport craft.

Despite the unfavorable record for the past year, and the murky outlook for this year, the aircraft industry has no wish to be resuscitated by government subsidy. It realizes further retrenchment and compacting of operations will be required. However, what it would like to see, as far as military planes are concerned, is a long-range procurement policy—say five years minimum—instead of the present year-to-year plan. Almost without exception the industry cannot project its plans beyond the end of this year since by that time it will have completed deliveries of the bulk of orders for new transport planes; and it will have been wrung out by three years of heavy losses which will make it difficult if not impossible to maintain further the design and production teams built over the past 10 to 20 years. Already many of these teams have been broken up by gravitation of personnel to other industries with a brighter future.

Developing New Policy—Two groups are working toward the development of a specific military procurement policy. One is the President's temporary Air Policy Commission which was scheduled to have its recommendations in the hands of the President by the first of the year. The second is a joint congressional Air Policy Board which will report by Mar. 1. To aid these groups, officials of most of the leading aircraft manufacturers have submitted reports, suggestions and supporting data, through the Aircraft Industries Association. The association has published this material in a 250-page booklet, "Ele-

How Long-Range Planning Aids Aircraft Industry



One reason why the aircraft industry seeks long-range planning in procurement of military planes is that work on succeeding models may be overlapped efficiently, thus stabilizing employment, as indicated in lower half of chart. Upper half depicts effects of unplanned procurement

ments of American Air Power," which offers a wealth of statistical detail concerning the present and future of aircraft production and operation.

Considering the outlook for cargo planes, L. B. Richardson, vice president of Curtiss-Wright, estimates that by 1950 the nation's commerce will require facilities for movement of 2 billion ton-miles of air cargo, and 5 billion ton-miles by 1952. This compares with actual movement of 90 million ton-miles in 1946 and perhaps something less than this the past year due to shrinkage in the number of independent carriers as against certificated operators. About 750 operating cargo planes would be needed by 1952 to handle this traffic—two-thirds of the long-range type and one-third the intercity type. By that time it is expected air freight rates will be down to less than 10 cents per ton-mile, directly competitive with expected ground service rates.

Shipping

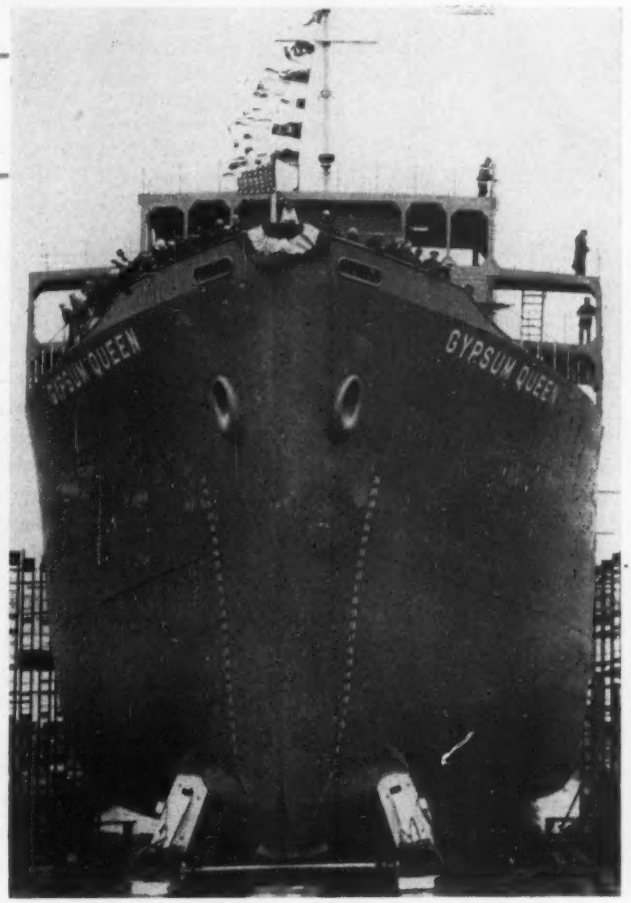
RECENT recommendation of President Truman's Merchant Marine Advisory Committee for construction of 46 passenger vessels plus an unspecified number of freighters and tankers points up in particular not only a lack of passenger vessel tonnage, but the importance, from the standpoint of national security and healthy economic expansion, of reviving activity at American shipyards, now close to the lowest ebb in 50 years.

As of Nov. 1, 1947, only 36 ocean-going merchant vessels and large dredges, totaling approximately 200,000 gross tons, were under construction in American yards, as compared with 62 merchant vessels of 391,000 tons at the beginning of the year, with practically all construction on the ways scheduled for completion by the middle of this year. By contrast, interestingly, Great Britain and Ireland, have more than 2 million gross tons currently under construction.

Employment Off Sharply—Indicative of the disintegration of American shipbuilding industry since the war is the fact that the trained engineering and technical personnel and skilled construction workers, the life-blood of the industry, have declined in number from a war peak of 1,700,000 to less than 90,000 in private shipbuilding and ship repair yards and to less than 30,000, as engaged in actual ship construction.

It is proposed that the program for construction of the 46 passenger vessels be gotten under way in the government fiscal year of 1948, with the accompanying recommendation that the government pay 50 per cent of the cost, a subsidy permitted by the 1936 act and used under congressional approval during the last war. Eight ships are scheduled to get under construction during fiscal 1948, with 10 in the fiscal year of 1949, 13 in 1950 and 15 in 1951. The program is to be completed by 1953, with the total approximate cost, on the basis of present price levels, ranging between $500,000,000 and $600,000,000.

While this schedule is not advocated as a rigid requirement, the President's committee nevertheless regards it as a realistic approach toward putting the merchant marine and the shipbuilding industry on a sound continuing basis. It is necessary that this step lead in subsequent years to the development of an annual replacement program of cargo, passenger-carrying and tanker tonnage.



From peak activity of wartime, American shipbuilding has sunk to near its lowest point in 50 years

Extent to which merchant ship construction in this country has fallen behind certain other leading maritime nations of the world is brought out in figures by Lloyd's Register for the quarters ending Sept. 30 and June 30 last year, and applying to vessels 100 gross tons and over. Lloyd's figures are as follows:

	Sept. 30, 1947	June 30, 1947
Great Britain and Ireland	2,112,669	2,062,949
Sweden	294,345	266,905
Holland	260,781	224,428
France	257,046	236,678
Italy	222,037	191,342
British Dominions* (including Canada)	189,905*	221,494*
United States	177,669	183,236
Denmark	146,292	139,992
Spain	110,361	112,524
Norway	86,612	80,906
Belgium	83,315	98,146
Other Countries	27,861	28,056
	3,968,893	3,846,656

(*)—Canada—142,600 and 161,160 respectively.

By GUY HUBBARD
Machine Tool Editor, STEEL

METALWORKIN

Year-end upswing in machine tool business encourages builders to believe that vigorous promotion centering around economic advantages of new models will push 1948 sales over $300 million

AFTER more than 12 years of uncertain and thoroughly abnormal conditions, years made abnormal by the aftermath of the depression of the early 1930s, by defense and preparedness programs, by World War II and by the hectic period of transition immediately following that war, an event took place in September of 1947 which well can be considered as the setting up of another important milestone. That event was the National Machine Tool Show.

There is strong possibility that its like never will be seen again as far as size is concerned, for the simple reason no suitable setting for such a 12-acre exhibition is likely to be available again. There also is strong probability that not for another five years at least will the association see fit to hold another.

Effect on Business—In view of these circumstances, possibilities and probabilities, it is fitting to review 1947 and to project our thinking into 1948, primarily in terms of what the big show did to business in 1947, and of what its momentum can be made to do for business in 1948.

Bear in mind that this 1947 show actually covered many things other than "machines which remove metal in the form of chips." Numerous machines for pressing, stamping, rolling, squeezing, and otherwise "plastic" forming metal parts were included.

That condition of things emphasizes the necessity for a new type of salesmanship in 1948—salesmanship involving intimate knowledge of new materials, of new manufacturing techniques other than those on machine tools, of new types of products and of new economic conditions.

A year ago, most machinery builders were beset by many and unusual doubts and uncertainties. For example: "Would the Machine Tool Show actually be held? If so, would there be time to complete and test the radically new machines and tooling set-ups which were being readied for it? Would there be a big slide-off in new orders and wholesale cancellations of orders already booked, when news of the show spread among prospects and customers?

Bargain Sales—Would "bargain sales" from War Assets Administration continue to plague builders?

Would many important programs of rehabilitation and expansion in the automotive industry and in other mass production industries be suspended or dropped because of high building costs, shortages of steel and other raw and semifinished materials, or labor difficulties?

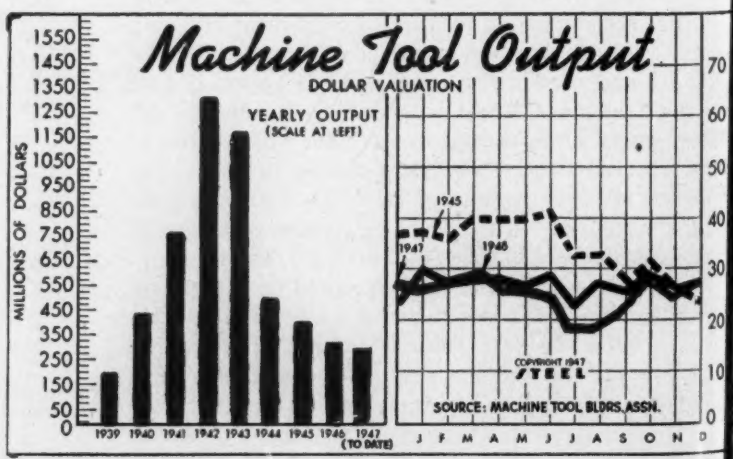
Would more foreign prospects find themselves behind the "Iron Curtain" or without tangible assets for financing purchases of much-needed American equipment? Would rising costs of materials, components and especially of labor, bring about a period of "profitless prosperity"?

Here are some comments on the foregoing "question marks" of 1947 in terms of 1948 expectations. First, the big Machine Tool Show finally was made an actuality largely because Herbert H. Pease, 1946-1947 president of the National Machine Tool Builders Association went to Washington, tore into governmental red tape and departmental disputes in which the Dodge-Chicago plant was involved, and finally got a valid lease for the association.

Machine Tool Shipments
(000 omitted)

	1947	1946	1945	1944
Jan.	$26,542	$30,263	$37,353	$56,363
Feb.	26,765	26,949	36,018	50,138
Mar.	29,012	27,326	40,045	51,907
Apr.	26,857	28,108	40,170	41,370
May	25,791	26,580	39,825	41,819
June	24,383	28,580	41,040	41,471
July	18,924	22,360	32,504	32,753
Aug.	18,520	26,911	32,500	35,177
Sept.	22,285	25,468	27,300	35,889
Oct.	27,545	29,140	31,200	37,516
Nov.	24,503	26,176	26,084	36,277
Dec.	27,500*	27,587	23,276	36,784
Total	$300,000*	$325,448	$407,315	$497,464

* Estimated.



MACHINERY

As to the effect of news of this show on 1947 business, it does appear that shipments "slid off" in July and August, that new orders were down in July, August and September. On the other hand, cancellations for those months were, if anything, below normal for the year.

Conditions Improve—As to the WAA situation, things definitely are better as far as the machine builders are concerned. James Y. Scott, chairman of the Government Relations Committee of the National Machine Tool Builders' Association, reported at its spring meeting in Atlantic City that "much of the cream has been skimmed off the WAA warehouse stocks."

As to large programs of rehabilitation and expansion in the mass production industries—some of which actually were held up for various reasons during 1947—several have been revived since the Machine Tool Show and several new ones added.

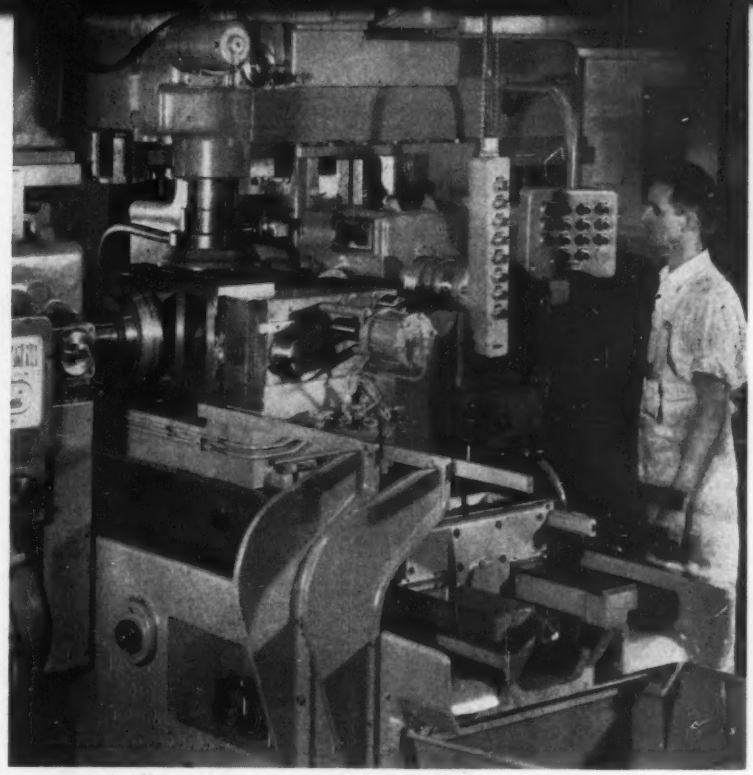
As to the foreign sales situation, many of the leading American machinery builders investigated it personally in 1947. Except in regard to Sweden, Switzerland, Belgium, Holland and a few other "sound currency" spots, reports were not encouraging.

At the fall meeting of the National Machine Tool Builders' Association, Alexander S. Keller, chairman, Foreign Sales Committee, summed up by saying: "We all know of innumerable foreign orders that would be placed—if the necessary dollars only were available to the purchasers.

"The Marshall Plan is the greatest potential factor toward supplying additional dollar credits, some of which may be utilized in the purchase of American machine tools."

As to the price outlook on metalworking machinery for 1948, Herbert H. Pease dealt with it realistically in his recent "valedictory" address, when he said:

"Every concern in NMTBA which does make something else in addition to machine tools should price its machine tools so that they 'stand on their own feet' and bear their costs. We must not price ourselves out of business by pricing our machines too low."

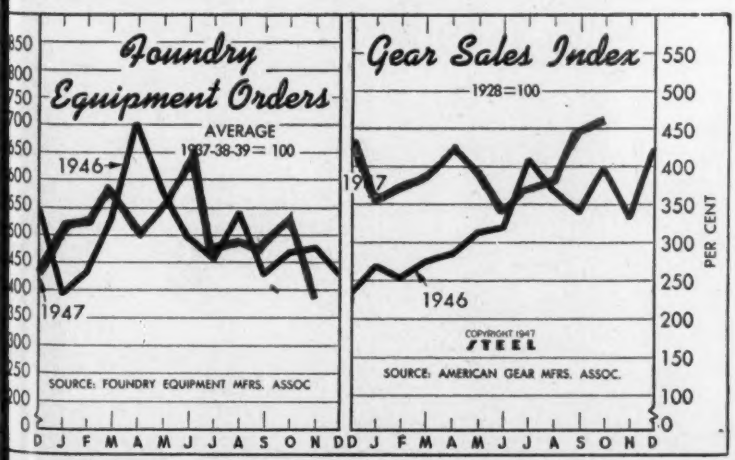


High-speed production milling machine, operating on three surfaces simultaneously under "fingertip control," is typical of metalcutting in the 1948 manner

Shipments Top $300 Million—A year-end estimate by the National Machine Tool Builders' Association sets the value of total shipments by its member companies in 1947 at approximately $300 million. This represents a combination of domestic and foreign business—including a substantial cut into the backlog. Also, this figure represents something less than 50 per cent of the annual productive capacity here in the United States.

"For the year ahead," says Alexander G. Bryant, newly elected president of the association, "not undue optimism, not undue pessimism—but realism!"

Appraising current trends and future prospects with all the realism recommended by Mr. Bryant, it is predicted that machine tool shipments for 1948 at least will equal—and very likely will exceed—the $300 million total of 1947.


Foundry Equipment Orders
AVERAGE 1937-38-39 = 100
1946
1947
SOURCE: FOUNDRY EQUIPMENT MFRS. ASSOC
Gear Sales Index
1928=100
1947
1946
COPYRIGHT 1947 STEEL
SOURCE: AMERICAN GEAR MFRS. ASSOC.
PER CENT
J F M A M J J A S O N D J F M A M J J A S O N D

	Foundry Equipment Orders Index (1937-38-39=100)			Gear Sales Index (1928=100)		
	1947	1946	1945	1947	1946	1945
Jan.	513.4	392.8	422.4	350	269	323
Feb.	521.9	432.8	465.3	376	253	331
Mar.	573.8	536.6	604.7	380	275	339
Apr.	512.1	701.2	325.0	424	284	296
May	548.6	577.3	404.7	387	313	309
June	649.9	491.7	375.4	343	321	271
July	458.7	453.4	411.7	361	407	264
Aug.	468.9	538.7	532.2	381	368	205
Sept.	455.1	424.4	577.2	450	342	213
Oct.	520.0	469.2	457.8	456	397	251
Nov.	370.1	477.4	416.6	...	336	255
Dec.	....	430.9	547.6	...	425	239
Ave.	....	493.9	461.7	...	332	275

Industrial Machinery an

Increased mechanization, spurred by rising wage costs, viewed as boon to industrial machinery manufacturers. New models also seen as support to sales in 1948

MANUFACTURERS of industrial machinery and equipment are looking to the uptrend in wage rates to serve them as a silent but super salesman.

While many companies in this field are still concerned with trying to fill orders that have been on the books for some time, they nevertheless are thinking seriously about the time when backlogs will have melted away and when new demand will have to be inspired.

That the rise in wages offers real hope for a stimulus to sales of machinery which will increase efficiency in utilization of labor can be seen from a comparison of manufacturing wage rates. At the close of the war the average hourly earnings for all manufacturing, according to the U. S. Bureau of Labor Statistics, was 102.4 cents an hour. By August, 1947, it had risen to 123.8 cents, a 20 per cent increase, and was still going up. Compared with January, 1939, when the rate was 63.2 cents, the August, 1947, level was 95 per cent higher.

However, producers of industrial machinery and equipment will not depend entirely on rising wage rates to produce new orders. As an aid to sales, many companies in this field are counting to a great extent on new models. During the war and for a while afterward, the main aim was volume production, and any change in models or design interfered with this. Now that private companies are paying

Turbine makers are busy filling industry's needs. Here an all-welded spiral casing for a hydraulic turbine is being shop-assembled

Equipment

By VANCE BELL
Associate Editor, STEEL

the bills and with the sellers' heyday much nearer an end, efficiency and economy of equipment are receiving increasing consideration. These factors are necessitating improved equipment—new models.

Although an increasing sales effort is expected to be necessary in 1948, one form of competition—war surplus—is dying out as the disposable supply of government-owned machinery tapers off.

Meanwhile, inflation and insufficiency of materials, notably steel, are complicating problems in the industry.

To report specifically what some of the important segments of the industrial machinery and equipment industry are doing to meet current and forthcoming conditions, the following summaries are presented:

Industrial Powered Trucks—Manufacturers of industrial powered trucks are in one of the most favored positions to gain from industry's effort to mechanize further in an effort to hold down or reduce production costs, for one of the biggest fields for labor-saving equipment is in materials handling.

Furthermore, industrial powered truck manufacturers have the advantage that the recent war with its manpower shortages brought wide recognition of the possibilities of speeding production and cutting costs through use of industrial trucks.

Most producers of industrial powered trucks report they still have order backlogs, but as they are shrinking, efforts to book new business will be intensified, with a number of producers counting on new models to help clinch sales.

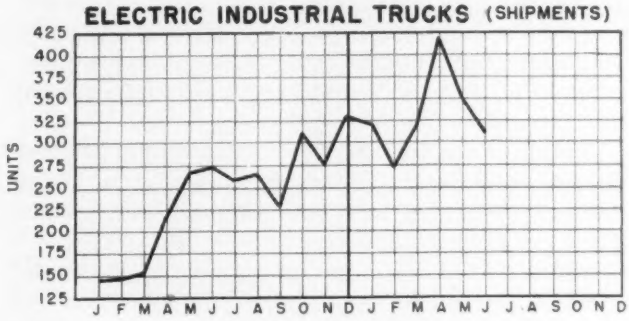
Conveyors — Another industry benefiting from increased recognition of the cost-cutting possibilities through improved efficiency in materials handling is the conveyor manufacturing group.

Since the beginning of the war there has been a steadily increasing demand for conveyors. The increase results from the replacement of old equipment, the heavy demand brought about by expansion of industries, and the desire to improve efficiency in utilization of labor.

Increasing the advantage of conveyors when efficiency programs are being considered has been the marked improvement in the last ten years in the overall design of conveyors.

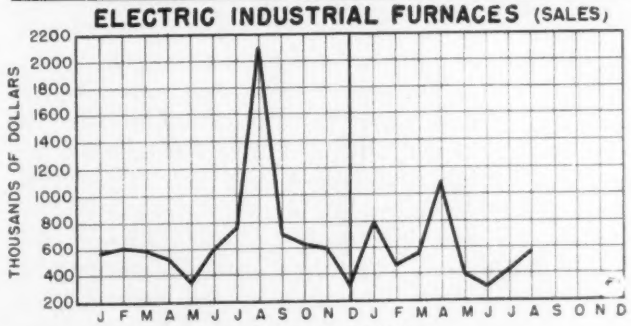
Although some standardized conveying equipment can be delivered in about three weeks from the time the order is placed, the backlogs on custom-built installations range up to a year and more, with one company reporting the present accumulation of orders is greater than at any time in the last three years.

Industrial Furnaces, Ovens—Conclusion of indus-



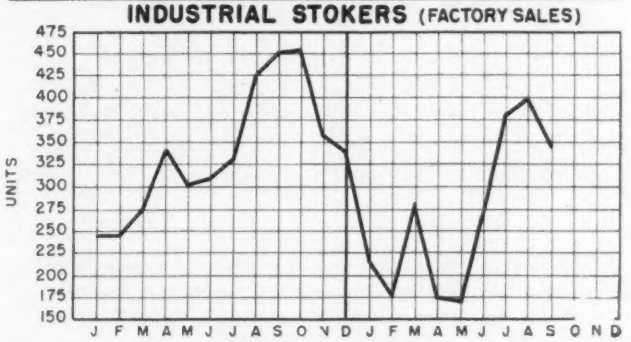
Factory Shipments (Units)

	1946			1947	
Jan.	146	July	258	Jan.	320	July	...
Feb.	148	Aug.	265	Feb.	273	Aug.	...
Mar.	154	Sept.	229	Mar.	320	Sept.	...
Apr.	219	Oct.	311	Apr.	420	Oct.	...
May	266	Nov.	276	May	349	Nov.	...
June	273	Dec.	330	June	321	Dec.	...



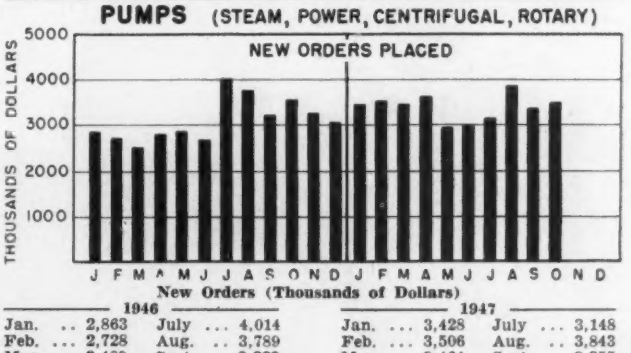
Sales (Thousands of Dollars)

	1946			1947	
Jan.	570	July	771	Jan.	789	July	432
Feb.	614	Aug.	2,104	Feb.	476	Aug.	565
Mar.	604	Sept.	714	Mar.	551	Sept.	...
Apr.	527	Oct.	647	Apr.	1,079	Oct.	...
May	351	Nov.	600	May	389	Nov.	...
June	606	Dec.	322	June	308	Dec.	...



Factory Sales (Units)

	1946			1947	
Jan.	245	July	330	Jan.	215	July	380
Feb.	246	Aug.	427	Feb.	177	Aug.	398
Mar.	275	Sept.	450	Mar.	280	Sept.	345
Apr.	342	Oct.	454	Apr.	174	Oct.	...
May	303	Nov.	357	May	170	Nov.	...
June	309	Dec.	339	June	270	Dec.	...


PUMPS (STEAM, POWER, CENTRIFUGAL, ROTARY)
NEW ORDERS PLACED
THOUSANDS OF DOLLARS
5000
4000
3000
2000
1000
J F M A M J J A S O N D J F M A M J J A S O N D

New Orders (Thousands of Dollars)

	1946			1947	
Jan.	2,863	July	4,014	Jan.	3,428	July	3,148
Feb.	2,728	Aug.	3,789	Feb.	3,506	Aug.	3,843
Mar.	2,489	Sept.	3,223	Mar.	3,464	Sept.	3,355
Apr.	2,803	Oct.	3,581	Apr.	3,638	Oct.	3,475
May	2,856	Nov.	3,260	May	2,973	Nov.	...
June	2,648	Dec.	3,035	June	2,999	Dec.	...

try about the middle of 1947 that a recession was not likely to occur immediately, plus growing awareness of the need for improving efficiency strengthened demand for heat-treating furnaces in the latter half of the year, and producers expect this upward trend to continue well into 1948.

Competition in the field of heat-treating furnaces has been keen in the last two years, with some of the competition coming from government-owned surplus which, however, is progressively tapering off.

Baking and drying ovens have been in greater demand in the last two years than during the war period. This demand is attributed to necessity of replacing old equipment, to obtain increased efficiency, and in some cases to expand capacity.

Backlogs of orders for heat-treating furnaces average seven months' production, but this figure includes very large furnaces which require nine months to a year for engineering and erection. Deliveries on smaller units require about three months.

Deliveries of standard heat-treating furnaces depend largely on the time required to obtain materials for them, while deliveries of special furnaces are determined by the time needed to do the engineering, the industry reporting shortage of draftsmen.

Since the war, industrial furnaces have been improved materially. During the war, developments were slowed down, inasmuch as the principal aim was volume production. In the last two years, however, new types of furnaces have been introduced, the tendency being toward automatic features. Now that private companies are paying for the equipment, efficiency and economy are receiving increased consideration.

Stokers—While sales of domestic stokers were disappointing in 1947, sales and installations of commercial and industrial units held up fairly well. In fact, installations of the larger commercial and industrial stokers increased measurably in some areas, particularly in the Middle West, because of the lack of adequate supplies of heavy burning oils. Also contributing to the strength in sales of industrial stokers, according to the Stoker Manufacturers Association, Chicago, is the material increase in plant operating and labor costs that have influenced plant managers to seek economy in producing steam, heat and power by utilizing low-cost coal through stokers.

Although the number of small domestic stokers sold exceeds by far the commercial and industrial units, the decline of factory sales of the commercial and industrial units in the first nine months of 1947 was far less percentage-wise than was the case with the smaller domestic type. Total number of the small, domestic stokers sold in the first nine months of 1947 was only 51,375, a 65 per cent drop from the 147,032 units sold in the corresponding period of 1946, while factory sales of the larger commercial and industrial stokers totaled 2409 units, down only 18 per cent from the 2927 sold in the first nine months of 1946.

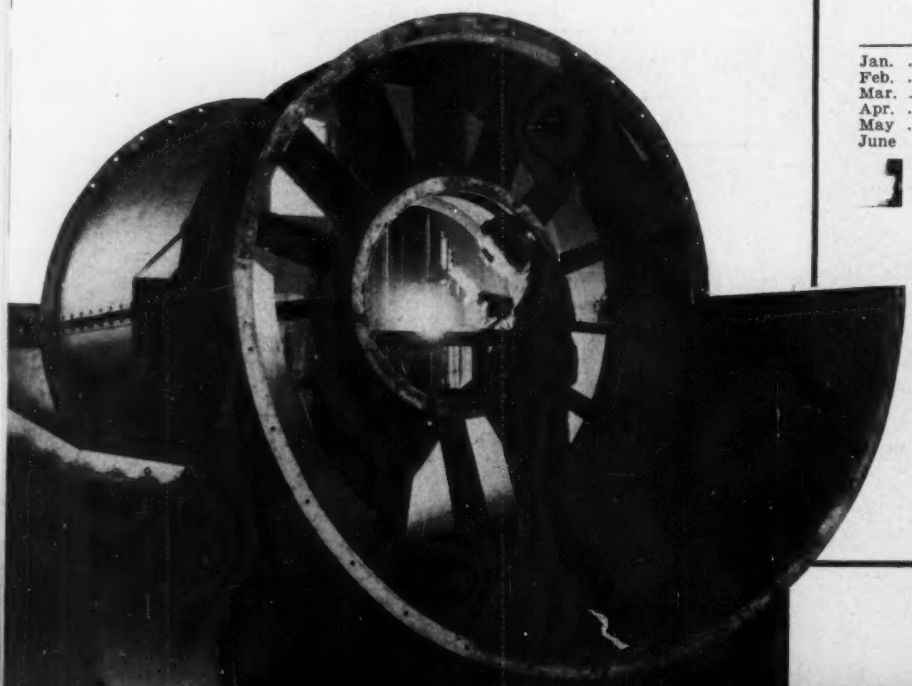
Looking into 1948, the stoker industry anticipates an increasing volume of business in the commercial and industrial field as a result not only of the shortage of heavy fuel oils but also because it is here, where large tonnages of fuel are involved, that economy plays such an important role.

Pumps — High level of industrial production is maintaining the need for industrial pumps. Volume of new orders placed for steam, power, centrifugal, and rotary pumps during the first ten months of 1947 amounted to $33,829,000, a gain of 9 per cent over the $30,967,000 for the corresponding period of 1946, although some of the increase is undoubtedly due to inflation in prices.

Appraising prospects for the future, the industry sees no drop in orders for some time to come.

Although deliveries have improved, the rise in demand has been great enough to make a slight increase in order backlogs.

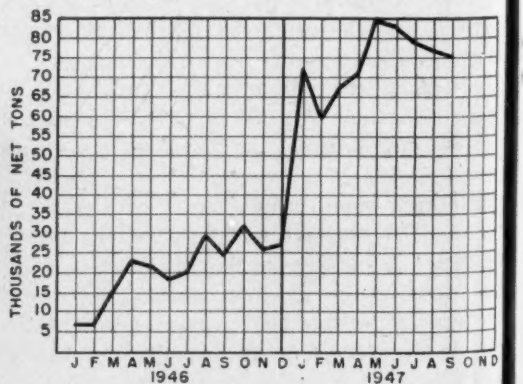
Plants producing equipment for coal mines are humming with activity. In one of these busy factories a mine fan is shown being fabricated



STEEL DISTRIBUTION TO OIL AND GAS DRILLING INDUSTRY

(All grades—Net tons)

1946			1947		
Jan.	6,741	July 20,164	Jan.	72,607	July 78,933
Feb.	6,741	Aug. 29,296	Feb.	59,808	Aug. 77,038
Mar.	15,018	Sept. 24,121	Mar.	67,350	Sept. 75,122
Apr.	23,157	Oct. 31,830	Apr.	71,361	Oct. ....
May	21,835	Nov. 25,914	May	84,956	Nov. ....
June	18,225	Dec. 27,158	June	83,381	Dec. ....



Roadbuilding Equipment—If road construction is not stifled further by rising wages and costs of materials, the outlook for manufacturers of roadbuilding machinery and equipment is bright. Despite the already high costs of construction, highway construction expenditures for 1948 are estimated by the American Road Builders' Association, Washington, at $1.5 billion, equalling the previous peak reached in 1930, although some of that huge figure represents price inflation. The 1948 estimate is compared with expenditures of recent years:

1939	$869,000,000	1942	$664,000,000	1945	$302,000,000
1940	896,000,000	1943	454,000,000	1946	706,000,000
1941	836,000,000	1944	360,000,000	1947	1,250,000,000

As might be expected from the construction industry's outlook, the roadbuilding machinery industry has a large backlog of orders, with new orders continuing to flow in steadily. However, lack of sufficient steel makes it impossible to step up production. Also in short supply are some component parts and diesel engines. Indicating, however, that the construction machinery industry was making headway in production in 1947 are U. S. Department of Commerce figures which show that value of shipments of excavating and earthmoving equipment in the second quarter was $113,438,123, compared with $102,168,766 in the first quarter. Increases in the value of shipments of all major types of equipment were reported, as is shown by the following figures:

	First Qtr.	Second Qtr.
Power cranes & shovels	$30,554,906	$33,018,607
Road construction & maintenance machinery	24,051,967	25,594,095
Construction machinery for mounting on tractors	9,799,865	10,919,398
Tracklaying tractors	31,975,550	36,287,363
Wheel-type heavy duty industrial tractors (including 2-wheel and 4-wheel)	3,314,490	4,941,741
Portable well & blast hole drills	2,471,988	2,676,919

Mining Machinery—Sharp increases in wage costs in the coal mining industry and a heavy consumption of coal not only are stimulating demand for mining machinery but are encouraging improvement of existing types of equipment and development of machinery to do work heretofore done by hand. Whereas the average hourly earnings of bituminous coal miners in January, 1941, was 88.5 cents an hour they had mounted to 149.1 cents in January, 1947, and then had shot up to 177.8 cents by August, 1947, according to the U. S. Bureau of Labor Statistics.

Indicative of the efforts to extend mechanization are reports from mining machinery builders that they have sizable backlogs of orders on hand and that new orders continue in substantial volume. In fact, some manufacturers expect 1948 to be their largest year in history.

Among new developments are a continuous coal mining machine and a rock tunneling and hard rock mining unit. The continuous coal mining machine will perform in one operation the separate functions of drilling, undercutting, blasting and loading. A separate machine now is required for each of these operations. About 60 per cent of the present bituminous coal mining in the United States is said to be suitable for application of this new continuous miner. The rock tunneling and hard rock mining unit will permit extension of underground trackless operation to tunnel driving and to iron ore, lead, zinc and other hard rock mining.

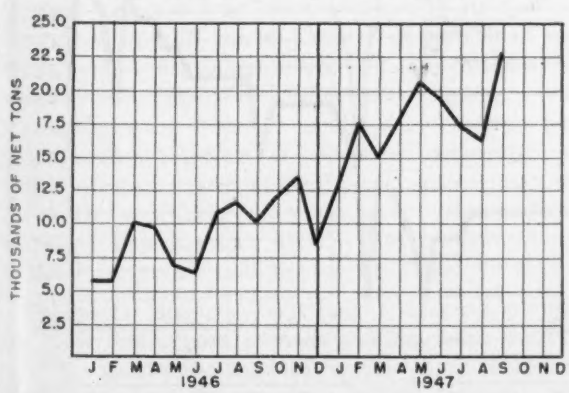
Oil Field Machinery—With current demand for petroleum products eclipsing needs of wartime when new all-time crude oil production records were being set, the oil field machinery and equipment makers look to a bright future as drilling activity expands. Indicative of the expansion, the average daily crude oil production in recent weeks has been well above 5,250,000 barrels, compared with 4,695,000 barrels in 1945 when war demands were at a peak. Not only are more wells being drilled but the average depth of well is increasing steadily because the remaining petroleum reserves are being found in deeper fields.

Only visible limit to output of oil field machinery and equipment is the steel supply.

STEEL DISTRIBUTION TO COAL MINING INDUSTRY

(All grades—Net tons)

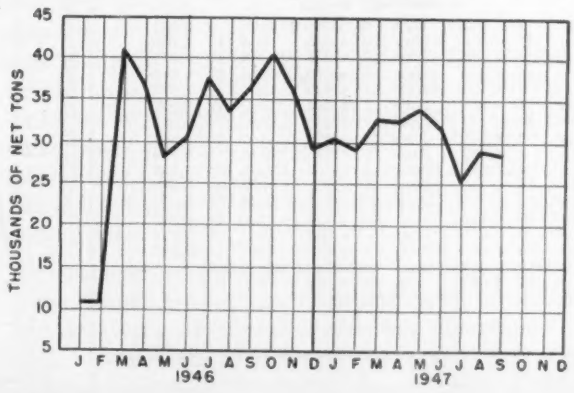
1946				1947			
Jan.	5,849	July	10,897	Jan.	12,926	July	17,440
Feb.	5,849	Aug.	11,592	Feb.	17,655	Aug.	16,369
Mar.	10,048	Sept.	10,142	Mar.	15,116	Sept.	22,826
Apr.	9,770	Oct.	12,110	Apr.	17,812	Oct.	....
May	7,076	Nov.	13,509	May	20,776	Nov.	....
June	6,586	Dec.	8,699	June	19,478	Dec.	....

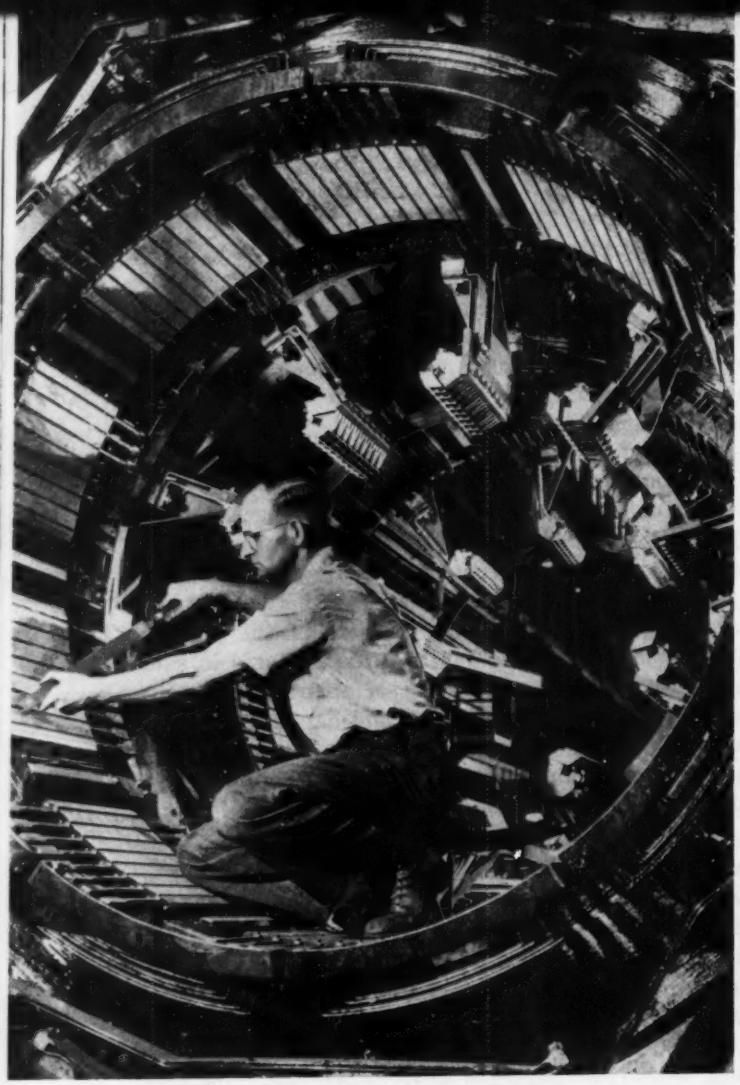


STEEL DISTRIBUTION FOR CONSTRUCTION MACHINERY AND RELATED EQUIPMENT

(All grades—Net tons)

1946				1947			
Jan.	10,716	July	37,867	Jan.	30,443	July	25,126
Feb.	10,716	Aug.	33,552	Feb.	29,197	Aug.	29,013
Mar.	40,978	Sept.	36,411	Mar.	32,619	Sept.	28,611
Apr.	36,902	Oct.	40,299	Apr.	32,490	Oct.	....
May	28,138	Nov.	36,098	May	33,906	Nov.	....
June	30,448	Dec.	29,375	June	31,578	Dec.	....





Under construction by the Westinghouse Electric Corp. is a 2500 kilowatt generator which will provide power for a steel mill. Above, a workman is shown smoothing rough edges inside the generator frame preparatory to its final assembly

Electrica

By J. C. SULLIVAN
Pittsburgh Editor, STEEL

SCHEDULED completions of expansion and modernization programs during 1948 should make possible continued production upturn in electrical power generation and distribution equipment.

Unavoidable delays in rearrangement of facilities not only retarded overall output of electrical apparatus an estimated 10 per cent in 1947, but forced many temporary shifts in production lines, adding to operating costs.

Revamping of facilities to meet augmented postwar demands for electrical apparatus is estimated to be about 75 per cent completed and has been carried out with the least possible interruption to production schedules. Disruption to operations resulting from this program was in many instances tempered to some extent by shortage of steel throughout 1947.

Prices Present Problem—Of growing concern to the electrical apparatus industry is the holding of current price levels in face of rising production costs. Since termination of the war, wage rates and raw materials costs have risen sharply. In many plants payrolls approximate 50 to 60 cents of each sales dollar.

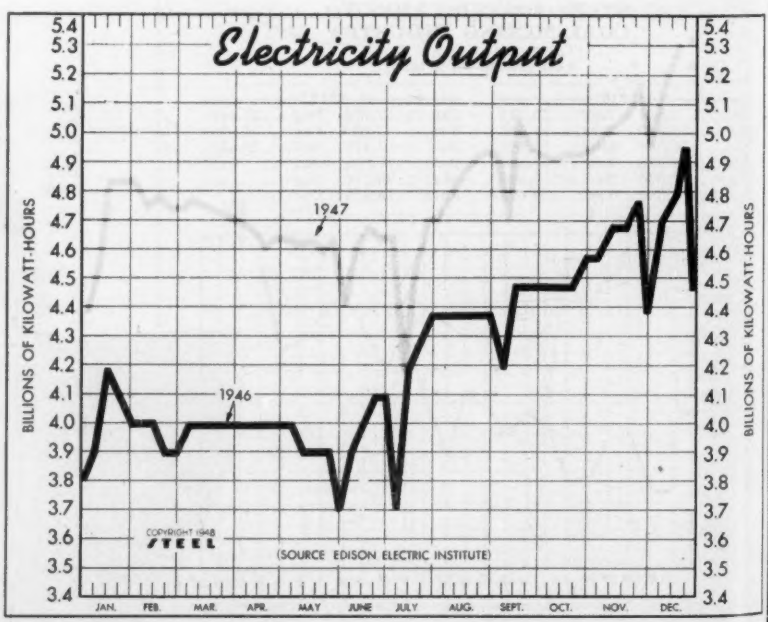
Industry spokesmen point out that profit in per cent of sales has declined due to higher unit labor costs, increase in material costs (in some instances

Electricity Output

(Millions of kilowatt-hours)

1947—By Weeks

Jan.	4	4,574	May	3	4,640	Sept.	6	4,721
Jan.	11	4,852	May	10	4,653	Sept.	13	5,053
Jan.	18	4,857	May	17	4,616	Sept.	20	4,977
Jan.	25	4,856	May	24	4,663	Sept.	27	4,956
Feb.	1	4,777	May	31	4,429	Oct.	4	4,935
Feb.	8	4,801	June	7	4,635	Oct.	11	4,958
Feb.	15	4,778	June	14	4,702	Oct.	18	4,946
Feb.	22	4,778	June	21	4,676	Oct.	25	4,964
Mar.	1	4,797	June	28	4,675	Nov.	1	5,009
Mar.	8	4,787	July	5	4,190	Nov.	8	5,057
Mar.	15	4,764	July	12	4,531	Nov.	15	5,084
Mar.	22	4,759	July	19	4,732	Nov.	22	5,181
Mar.	29	4,729	July	26	4,730	Nov.	29	4,983
Apr.	5	4,693	Aug.	2	4,806	Dec.	6	5,218
Apr.	12	4,620	Aug.	9	4,874	Dec.	13	5,327
Apr.	19	4,660	Aug.	16	4,923	Dec.	20	....
Apr.	26	4,668	Aug.	23	4,953	Dec.	27	....
			Aug.	30	4,940			



Equipment

Expansion and modernization programs likely to make possible continued production upturn in electric power generation and distribution equipment

purchasing at gray market prices to meet emergency needs), and other production expenses. Realized prices on current shipments are not yet up to the level quoted on new business, the industry having booked considerable volume of new orders toward the close of the war and shortly thereafter at firm prices that are considerably below current quotations. Shipment of these lower priced orders is not expected to be completed until near the close of 1948.

Price Reductions Unlikely—Industry members state there is not much prospect of price reductions over the coming months, with payrolls representing such a large proportion of costs. There also is developing a strong likelihood of another round of wage advances next spring.

Some manufacturers contend there is little opportunity to reduce their unit costs substantially in the near future as the result of improved production techniques. Manufacturing facilities are estimated to be operating at about 85 per cent of normal despite current programs of relocating facilities. A definite improvement in labor efficiency did develop in the latter months of 1947, although this situation was by no means true at all plants.

Raw Materials Higher—Although official data are not available it is estimated that electrical apparatus manufacturers are paying 45 to 50 per cent above 1940 levels for raw materials; and overall production costs are as high as 90 per cent of sales revenue in some instances, in contrast to about 80 to 85 per cent in 1940. Increase in industry's averaged realized prices on shipments toward the close of 1947 is estimated to approximate slightly over 30 per cent above the 1940 price levels.

Add Distribution Outlets—Many companies in the electrical apparatus field are substantially augmenting warehousing depots to improve emergency service to customers. It is the aim of one large producer to establish these distribution outlets so that the farthest point within each marketing area can be reached within 48 hours. Greater dispersion of warehousing facilities is expected to make possible more efficient production scheduling and planning.

Despite rising trend in construction costs to record levels, manufacturers of electrical apparatus continued to carry out extensive expansion and modernization programs last year, based on projected demand outlook through 1950. And no retrenchment in these programs is indicated for 1948.

Prospects Bright—Very bright demand prospects for electrical apparatus over coming years would appear to justify the industry's large scale modernization and expansion program. The electrical utility companies are a relatively more important outlet for heavy electrical apparatus than in prewar years, when sales to this group represented a declining proportion of the total in comparison with that for home appliances and industrial equipment.

The following table will indicate the estimated extent of expanding requirements for power generating and distribution equipment for public utilities through 1957 based on projected increase in facilities and peak power requirements.

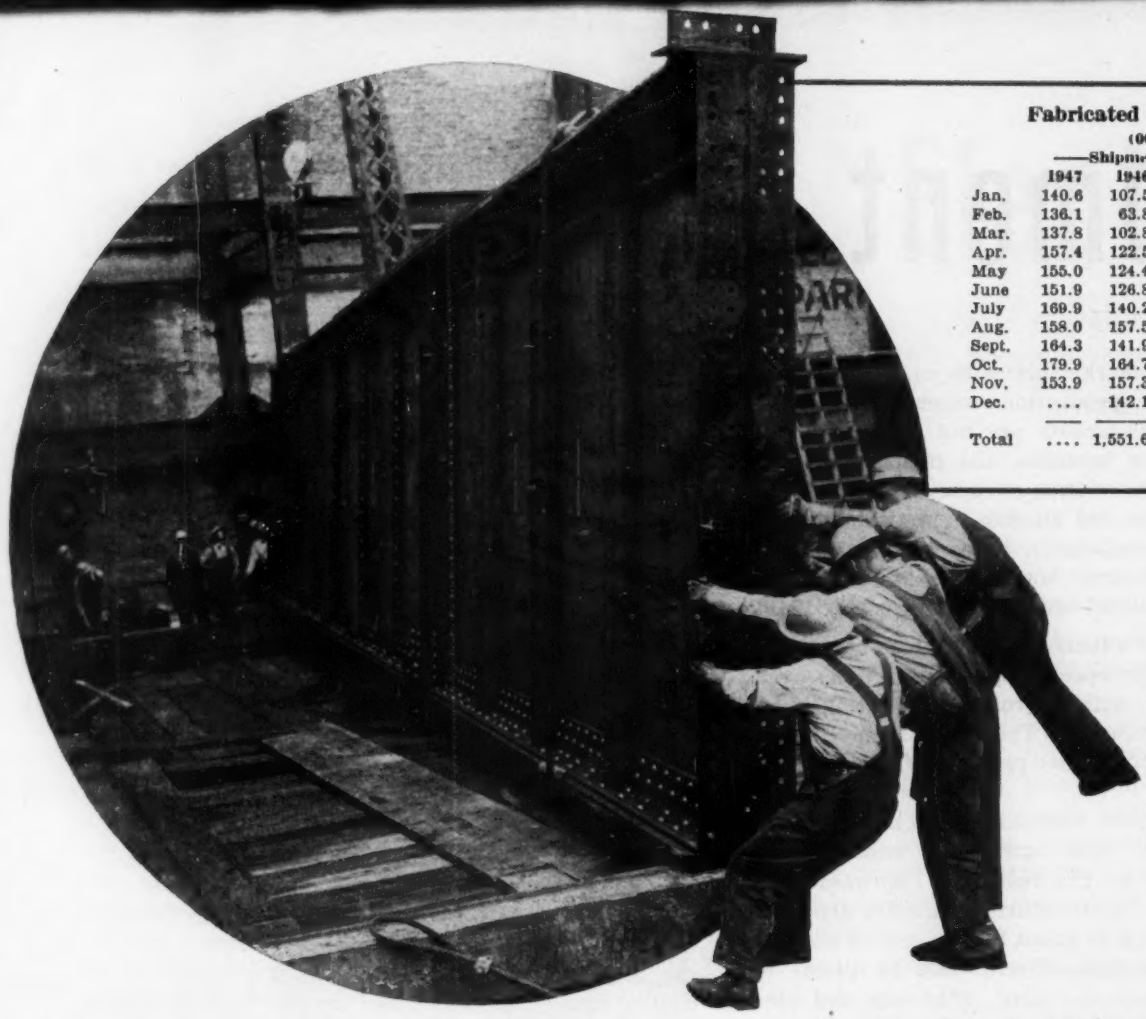
Dec. 31	KW Generating Capacity (Millions)	Peak Load Demand
1937	37	25.4
1945	50	40.5
1947	52	48.0
1950	66	56.0
1957	80–85	68.0

On the basis of the above overall estimate of future generating plant requirements, no let-up in production of electrical apparatus for the utility industry is indicated until well into 1950 at earliest. Reflecting the fact that bulk of the power generating and control equipment orders already have been placed to meet projected requirements, leading producers report that output exceeded new order volume during the closing months of last year. Since most utility companies plan expansion programs in 5 to 10 year cycles, an additional influx of orders is expected by electrical apparatus producers by 1950.

Makers of the smaller control equipment, such as switches and other devices, will benefit from the prospective record activity in the heavier fields.

Decline Is Expected—Excluding public utility electrical generating and control equipment, manufacturers of electrical apparatus expect a decline in new bookings during the last half of 1948, amounting to about 5 to 10 per cent below 1947 sales volume. Average monthly new order volume during 1947 for this group of electrical apparatus was about twice the prewar level, but off nearly 30 per cent from that recorded during 1946. Order backlogs for meters, gearing, switches, industrial blowers, etc., are not extended nearly so far as for power generating and control equipment. Output of lighting equipment, for example, was recently reduced at some plants, due in some instances to a temporary inventory problem. It is estimated output of this group of industrial electrical apparatus is at annual rate of 2 to 2½ times prewar level.

Change Price Policy—As a protection against possible future production cost increases, manufacturers of heavy electrical apparatus abandoned their "firm" price policy on heavy equipment toward the close of last year.



Fabricated Structural Steel

(000 Tons)

	Shipments			Backlogs		
	1947	1946	1945	1947	1946	1945
Jan.	140.6	107.5	57.0	661	552	124
Feb.	136.1	63.8	49.0	656	551	152
Mar.	137.8	102.8	59.5	614	605	153
Apr.	157.4	122.5	62.8	632	674	163
May	155.0	124.4	72.6	628	615	166
June	151.9	126.8	69.2	634	642	195
July	169.9	140.2	69.9	661	674	194
Aug.	158.0	157.5	70.6	639	651	201
Sept.	164.3	141.9	63.4	648	682	248
Oct.	179.9	164.7	76.6	649	660	283
Nov.	153.9	157.3	78.0	645	665	305
Dec.	....	142.1	68.8	...	646	375
Total	....	1,551.6	797.4	...	...	...

This 28-ton, 62 by 10 ft girder for a San Francisco department store was too large to be moved over the Bay bridge from Alameda, Calif.

Construction

Past year's construction total in dollar volume among largest on record but physical volume was not as impressive as in some years because of higher costs

NEW CONSTRUCTION in the United States last year approximated $12 billion, an estimated total of $3.3 billion for private non-resident building and $510 million, public non-resident.

From these two groups the bulk of structural steel demand emanates. Housing is included in other classifications largely and while dwellings take a large tonnage of steel and other fabricated metals in the aggregate, the requirements are more diversified.

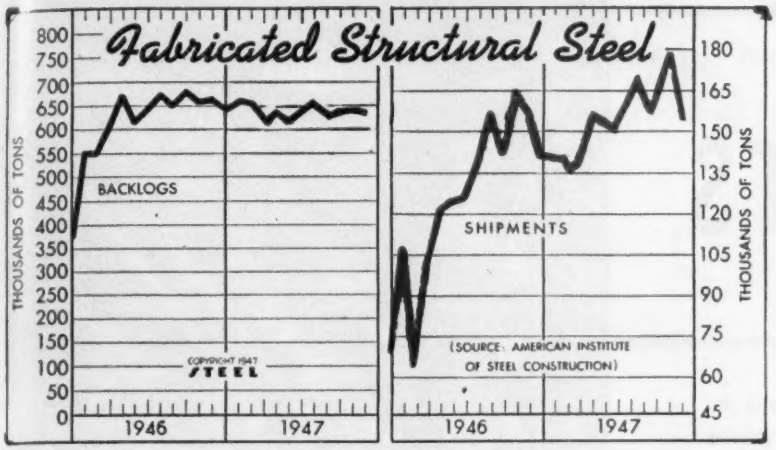
The 1947 construction total in dollar value was among the largest on record, but because of steadily increasing costs the physical volume was not as impressive as in some years. What the total will be for 1948 is a matter of conjecture with prices still in need of stabilization. The backlog in all types of construction is heavy, notably the investment type which has been retarded for some years, and the fabricating industry enters the year with a backlog of around 650,000 tons.

Shortages Hamper Activity—In common with most industries depending on steel, structural fabricators have been hampered by plain material shortages and high labor costs, adverse factors carrying over into 1948 which must be corrected, or at least stabilized, if the industry is to reach expected postwar levels in the near future.

Orders for fabricated structural steel approximated 1,600,000 tons in 1947, about 126,000 tons under 1946 bookings. This reversal in trend the second full year after the war, and contrary to earlier forecasts, is due directly to faulty economic conditions. There is no lack of prospective work; estimating boards bulge with tonnage, but a heavy volume is held back because of numerous unfavorable factors, not the least of which are high costs and low productivity per worker.

When fabricated structural steel in place goes to 15 cents and more per pound, this increase being moderate in relation to other building materials, bookings to the extent of 1,600,000 tons and shipments in the neighborhood of 1,800,000 tons are noteworthy, especially as regulations restraining non-housing construction were in force the first six months of last year.

Prices Are Up — Building material prices are up 98.6 per cent over 1939; lumber increased the most,



By L. E. BROWNE
Associate Editor, STEEL

196.9 per cent, but fabricated structural steel is only 33.3 per cent higher. And this advance in steel results largely from soaring shop and erection costs, higher freight rates and miscellaneous charges, rather than in plain material.

The construction industry is riddled with unfavorable economic factors which have increased building costs to a point where many projects are held up. This trend has gathered momentum in recent months and will probably continue until costs are stabilized at more reasonable levels. Wages in the building trades are up 76 per cent with individual productivity down 38 per cent. A brick layer who formerly laid 1000 brick a day is now laying around 540; carpenters are driving fewer nails, plumbers installing less pipe and structural steel erectors and shop men are driving a reduced number of rivets per man.

Tonnage Inadequate—Another circumstance plaguing the structural fabricator is lack of adequate tonnage to meet even existing demand. Structural mills are shipping at the rate of 4,400,000 tons per year compared with 3,474,284 tons in 1946. As fabricating shops shipped about 1,800,000 tons last year, this indicates 2,600,000 tons went to consumers other than the structural fabricating industry. There is always a rather surprising spread between structural production and shop receipts, but this variance is greater than usual.

Heavier shipments for freight carbuilding and to warehouses account for a good part of this increase. Slightly over 7 per cent of total steel shipments currently are by structural mills. Involved in lagging delivery of plain material is the lead time required for rotation of rolling schedules for different sizes. This tends to increase inventory of material for specific jobs and some times roof steel is delivered ahead of grillage material; this uneven flow of material adds to shop costs.

In engineering and research the structural fabricating industry is not idle with programs planned toward competitive days ahead. Not the least in importance is research covering the fireproofing of structural steel frames, permitting designers to use less concrete and heavy masonry as fireproofing. Approval of gypsum-vermiculite as a fireproofing material is increasing.

Revised Practices—An outstanding example in the use of bolts and nuts in field joining multi-story structural steel frames, the largest use of these fasteners to date in steel erecting is the Metropolitan Life Insurance Co. housing projects, New York. Here scores of 12 and 13-story buildings have bolted field connections, beams or girders to columns. Unfinished bolts with lock nuts and washers, insuring full unthreaded barrels for their entire bearing length, are utilized. All other field connections, including column splices are made with ordinary unfinished bolts. This portends revised specifications, new standards and construction techniques for structural rivets and bolts.

After extensive tests covering the static strength of riveted joints and bolts for specific uses, American Institute of Steel Construction revised specification for the design, fabrication and erection of structural steel for buildings to an allowable unit tension stress in bolts and rivets of 20,000 psi; formerly allowable unit tension values were 12,000 psi for bolts and 15,000 psi for rivets.

Using Weldments—Although usually categoried for machine bases and heavy equipment, the use of weldments in fabricated steel structures, notably bridges, is increasing. Revisions in bridge design for weldments to replace castings for economies are frequent. Although stress relief treatment is required, no patterns are needed. Reflecting this trend is the operation of larger capacity heat-treating equipment. The trend toward longer plate girders continues and they are being fabricated in lengths undreamed of 10 years ago.

Prefabricated House—Much has been written about the prefabricated house as a prospective outlet for steel, the claim being made that this type of dwelling now has a golden opportunity to become established in view of the present housing shortage. This industry is also confronted with the same high costs and is frequently hampered by jurisdictional rows as to distribution of labor. Scores of companies, most of them new, have entered the field.

One of the most extensive programs has been embraced by the Lustron Corp., Chicago. This company has one million square feet in the former Curtiss-Wright plant, Columbus, O., and plans mass production of five-room houses, 30,000 in 1948, reaching peak volume about June.

Containers

Canmaking industry has not yet reached its postwar peak due to limitations on plate supply though it took about 3 million tons of total tin mill products shipped in 1947. Evolutionary changes in practice and processes are in progress

By L. E. BROWNE
Associate Editor, STEEL

WITH less tin the steel industry is producing more tin mill products, an estimated 4,485,000 tons in 1947. For this record tonnage slightly under 32,000 tons of tin were used. Considering that 40,189 tons were required for 3,269,966 tons of tin mill products as recently as 1940, it becomes readily apparent important but evolutionary changes in practice and processes, steel mill and fabricating, are in progress.

Accumulative savings of tin are estimated at 99,450 tons in seven years. In some respects the steel industry is the shepherd guiding and leading the flock toward higher peaks of industrial efficiency.

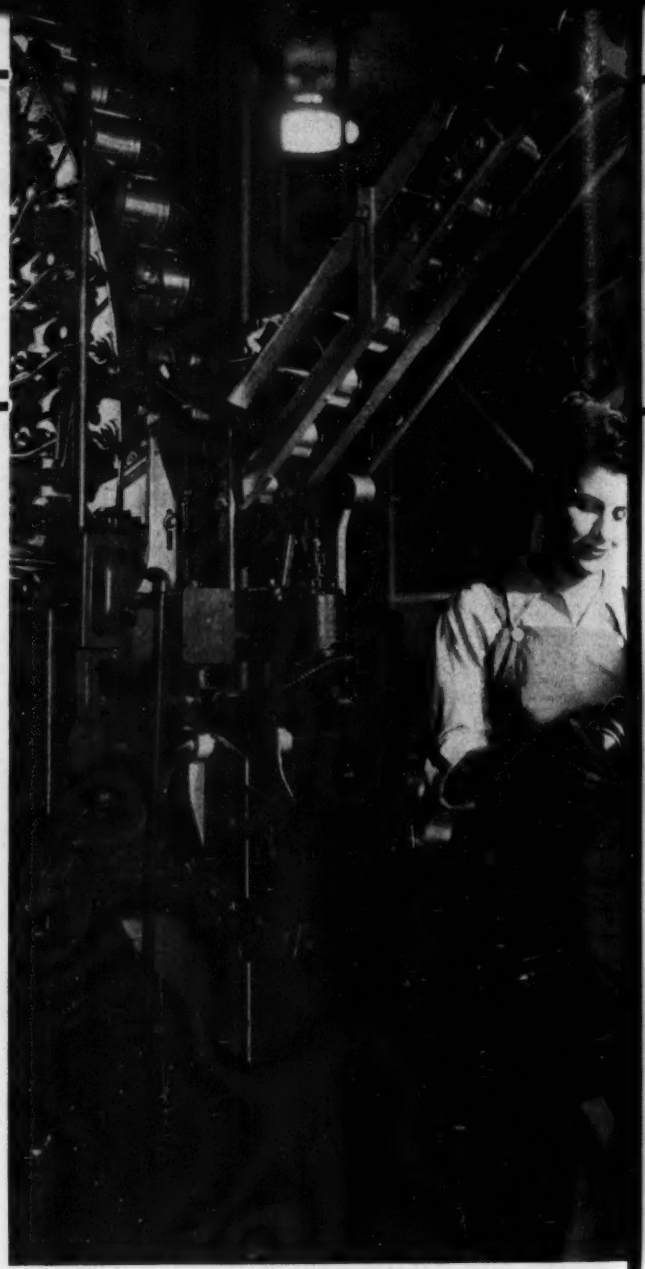
Changes Are Evolutionary—Changes in can manufacture are for the most part evolutionary rather than revolutionary. As in other metalworking industries, however, the trend is toward increased speeds. Faster filler operations are accompanied by higher speeds in closing apparatus. Spot welding, notably larger can sizes, has been upped to around 400 per minute, although use of low-tin solder tends to decrease welding; 300 keys a minute attached to cans is not unusual. Incidentally, more than 3500 tons of wire annually are required for keys.

The can industry has long experimented in fabricating from coils, but appears to be some distance away from commercial success.

The output of electrolytic tin plate may top that of hot-dipped this year. Yet at the start of this decade electrolytic coating was in the experimental stage. Overall tonnage was negligible.

Less Tin Used—From 1.31 pounds in 1940, average weight of tin now required for a base box of tin plate is close to .78 pound; this means changes in solders, enamelling, bonderizing and curtailment in the use of coating metal where possible. One pound of tin is now required to coat 135 pounds of steel whereas the same amount covered but 81 pounds a few years ago.

The can industry has not yet reached its postwar peak due to limitations on plate supply, although the industry took roughly 3,400,000 tons of total tin mill products shipped last year. The latter accounts for 7.1 per cent of the total steel shipments.



By means of air pressure cans are tested for leaks. Faulty ones are automatically discarded. Above is shown inspector at plant of American Can Co.

Canmakers are confronted with higher prices for tin plate this year, but supply of pig tin and steel in tin plate reduction gages offers slight encouragement for a larger tonnage during the first half at least. Electrolytic specifications are especially heavy and a return of some restrictions on the use of cans for beer, dog foods and other less essential products would not be surprising.

Supply May Improve—Inventories of consumers and producers as the year opens are low, but the supply situation may be gradually improved by additional new capacity.

Not only has electrolytic plate influenced fabrication of containers, but this grade is also a factor

RESEARCH CONTRIBUTION TO THE TIN CONSERVATION PROGRAM

YEAR	TIN MILL PRODUCTS TONS	TIN USED TIN MILL PRODUCTS TONS	LBS TIN PER B.B.	CUMULATIVE SAVINGS LONG TONS	Cumulative Tin Savings On Tin Mill Products Classified as to Use (Long Tons). EXPORT TIN PLATE	CLOSURES	METAL CANS
1940	3,269,966	40,189	1.31				
1941	4,351,597	46,650	1.14	6,829	250	245	6,334
1942	3,333,633	29,404	.94	18,396	1,594	745	16,057
1943	2,690,108	22,643	.90	28,814	2,524	2,165	24,125
1944	3,318,621	26,337	.85	43,263	3,669	4,625	34,969
1945	3,653,600	27,400	.80	60,766	4,799	7,085	48,882
1946	3,710,000	27,400	.80	78,846	5,739	9,545	62,792
1947*	4,485,000	31,012	.79	99,450	6,679	12,165	80,606

* Estimated.

in costs, the selling price being related to the amount of coating in comparison with hot-dipped quotations. Number of man hours per electrolytic-coated ton has been substantially reduced by higher production lines and high-speed cold reduction mills. Since volume production was established on electrolytic lines there has never been pig tin available in quantities sufficient to permit normal expansion and new uses; the most economical production point is still in doubt.

Conservation Advanced—Few industries have gone further in developing methods for the conservation of critical materials essential to operation than the can manufacturing.

Yet for export, plate is generally heavier tin coated than that used for many similar domestic containers.

More than 40 out of every 100 cans go to fruit and vegetable canners; 25 are for condensed and evaporated milk; like number are filled with other foods, while non-food products take approximately 10 out of every 100. July-September is the peak quarter in the can year.

Few containers are being produced that might be classified as new, with emphasis on production within limits of material and capacity. In some instances modifications of pre-war containers are being made; one tin-less (aluminum) beer can is a modification of an earlier seamless type.

Three relatively new types are being produced by American Can Co., each type serving a distinct field. One, a frozen food container, makes possible high-speed filling and closing by the frozen food industry. Another has a new type of closure providing moisture-vapor resistance for dried food and drug products. A third is a metal container employing organic compounds in the form of plastics as a seaming material.

Despite delays, plans for expansion of tin plate production are progressing. By mid-year new or improved units are expected to be in operation with a capacity of approximately 115 million base boxes compared with 86,125,000 in 1941.

Although world-wide tin production is increasing, new supplies are still below requirements; Malayan output has got back to a rate of about 44,000 tons a year, but Bolivian production last year was lower, near 31,000 metric tons. Maximum tin supply in sight for the first six months this year is around 45,000 tons, while demand by consuming industries, if unrestricted, is estimated at 59,000 tons. Of this, 20,000 tons is for tin and terne plate. Before the war consumption in this country was close to 80,000 tons annually, tin mill products taking about one-half. Export demand for tin plate is now at peak, around 1,500,000 net tons.

Prices Held Down—Although the manufacturer is confronted with further increased costs, the price of food cans has been held down to a remarkably low level in comparison with the cost of the material with which it is filled. The standard No. 2 size can, formed from hot-dipped plate, has been currently selling for 2.16 cents.

Adverse weather brought the packs of some food crops somewhat below record peaks of 1946, but total packs, 1947, compare well with prewar years. For the most part stocks of canned perishable food crops are ample until the 1948 harvest season. Some of the major crop packs estimated for 1947, compared with 1946 and 1936-45 average, are:

Sweet corn—26,800,000 cases, 1947; 30,951,000 cases, 1946; and 22,860,000 cases, 1936-45 average.

Peas—365,000 tons, 1947; 440,000 tons, 1946; and 282,419 tons, 1936-45 average.

Tomatoes—3,264,000 tons, 1947; 3,380,900 tons, 1946; and 2,343,200 tons, 1936-45 average.

Heavy Container Output Up—Production of heavy steel barrels and shipping drums, 1947, was substantially ahead of the 1946 total, in units about four million more than in 1946. On the other hand, that for light steel barrels and drums is slightly lower. Heavy steel barrels and drums include units made of 19-gage or heavier steel except beer barrels and those made wholly or partly of 20-gage or when other than open head construction; also grease drums of 100 pounds capacity when made of 20-gage or heavier steel.

Sharp increase is being made in the output of 55-gallon containers fabricated of 18-gage steel. Increase in the production of this unit contributes largely to the 1947 gains in the heavier group, nearly three million units.

In the lighter shipping barrel-drum group, lock seam construction continues to lead welded seam nearly three to one. This type of container, made of 20-gage and lighter steel, was produced in about equal quantities in the last two years.

In units, other types of steel shipping packages, kegs, pails, etc., are nearly seven million heavier, with five-gallon, 24-gage, accounting for more than half.

Agriculture

By E. F. ROSS
Chicago Editor, STEEL

Continued all-out farm production assures extension of maximum demand for machinery. Hope for solving world food problem rests on mechanization. Equipment sales at record high in 1947

THE AMERICAN farmer, who through five years of unparalleled food production enabled this country and its allies to emerge victorious in war, and who for two years since has held the pace to feed a hungry world, now faces the task of all-out effort for four more years.

Secretary of Agriculture Anderson's 1948 farm production goals call for continuation of high wartime levels of output. His goals call for 9 million acres more of cultivated and noncultivated crops than the 347 million acres used to produce the 1947 near-record total of farm commodities.

Given favorable yields per acre, total 1948 production might well top the record set in 1946. But regardless of the volume of harvests, this year's supplies of animal products—meats, poultry, eggs and dairy products—will be smaller than last year's.

Heavy Machinery Demand—Continued all-out farm production guarantees continuation of maximum demand for farm machinery and related equipment for in mechanization lies the farmer's best hope for high output. Abundant labor supply would be favorable to the objective also, but farm help is scarce and high priced. Farmers can not compete with industrial wages even at present farm prices. Agricultural wage rates are over three times what they were in 1939, thus the farmer's best chance seems to be in greater mechanization.

Since start of the war, output of farm equipment has failed to match demand. During the war, production was under government control and sales were by allocation; since the war, shortages of materials, particularly steel, have kept production at a level which would not overtake accumulated demand. Prospects in 1948 are for a good output year but there is no reason to believe implements will be available in fully sufficient supply.

Farm Income High—That the farmer will be in a position to buy new machinery this year there can be no question. His economic position is excellent with nothing now on its horizon to suggest impairment. Farm income last year was the highest on record and probably will remain high this year. Last year's gross farm income was estimated at $34,300,000,000 or 18 per cent above 1946. Net income—the difference between gross income and production expenses—was estimated at $18 billion.

Income in 1948 will depend largely on the volume of crop production and foreign demand. Domestic consumer purchasing power seems likely to remain high. Farm production expenses may continue to increase, and even if gross income is maintained at the 1947 level, net income may not be quite so high as in 1947.

Total cash receipts last year showed the largest percentage gain from the preceding year since 1943. In general, this was due to a substantial increase in prices for farm products.

Farmers' cash receipts from marketings during the first ten months of 1947 were estimated at $24.1 billion, 26 per cent more than in the same period of 1946. This included $13.9 billion in livestock and products and $10.2 billion from crops, increase of 30 per cent and 21 per cent, respectively. In addition, government payments were less than $300 million. Cash receipts from marketings and government payments combined totaled $24.4 billion, up 23 per cent over first ten months of 1946.

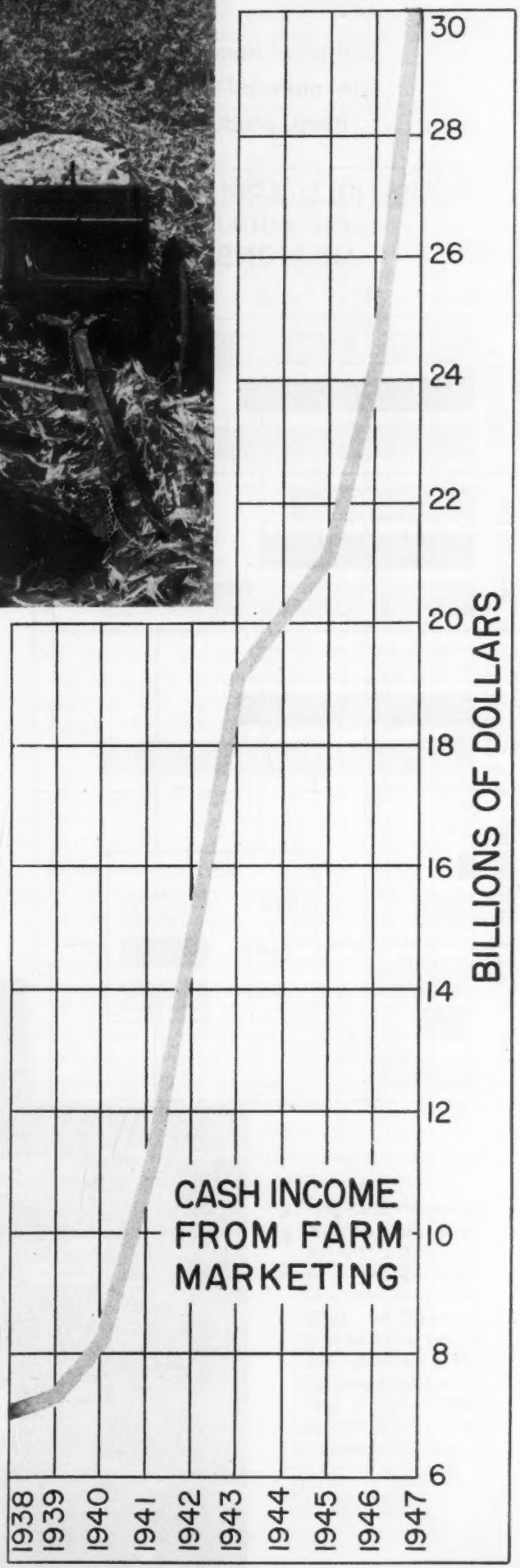
Machinery Costs More—Since 1939, price increases of farm machinery have averaged only 26 per cent, when most all other manufactured products have advanced 50 per cent or more. Thus, there are few places where the farmer can invest money to get greater return.

No statistics are available to catalog 1947 as a farm machinery production year. But best opinion, however, is that it was equal to or better than 1946. Unfortunately, the index which the Bureau of Census uses to gage the industry's activity is domestic and export sales, and because value of the dollar does not remain constant, comparisons over a period of years is not particularly enlightening.

For what it may be worth, however, the Bureau of Census reported domestic sales of farm machines and equipment in 1946 as $801,309,007. Comparable figures for preceding years were: $661,466,410 in 1945; $589,435,029 in 1944; and $335,453,416 in 1943. Sales for export for the same period were: $85,142,084 in 1946; $89,080,542 in 1945; $69,578,616 in 1944; and $42,887,371 in 1943.

Some Records Set—For some farm machinery makers, sales were at record highs in 1947. In some

Corn picker pulled by tractor speeds harvest on farms



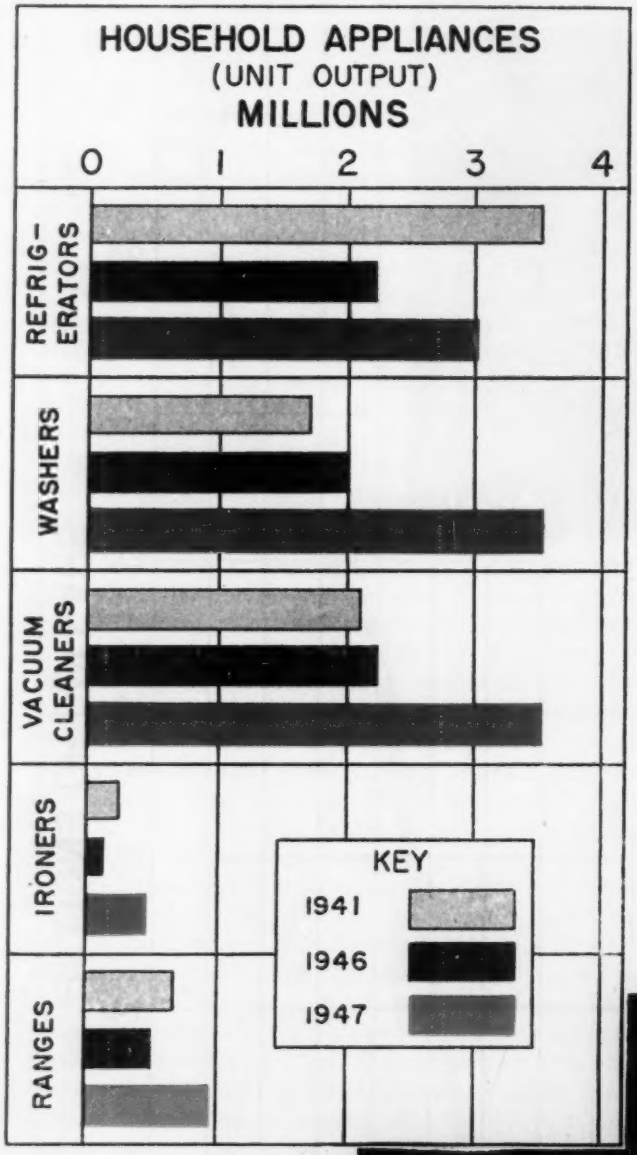
instances, sales would have been even higher had it been possible to obtain all materials needed for capacity operations and had not these companies lost production because of work stoppages.

High production operations is the appraisal of activity for 1948, but once more the limiting factor will be availability of raw materials. Most critical shortage has been in steel sheets and strip, a situation which may be eased but certainly not overcome this year. Certain types of castings also have been in inadequate supply.

Over the years, agriculture, including farm machinery, consumes about 2 per cent of the finished rolled steel produced in the United States. Statistics available for the first eight months of 1947 indicated shipments of finished steel to agriculture were running true to form. In 1946, shipments to agriculture amounted to 1,030,335 net tons, a figure which should have jumped to about 1,330,000 tons in 1947—this because steel output in 1947 increased about 29 per cent over 1946.

New Small Tractor—To be produced in volume this year for the first time is the new very small tractor and complementary implements engineered for the nation's smaller farm. Operators of small farms, faced with the necessity for increased production and the difficulty of hiring help, may be on the threshold of farming by mechanized techniques, something heretofore available only to big-acreage farmers.

Output of home appliances increased sharply during 1947 despite raw material shortages, and with one exception, among major items, production topped that of 1941 by substantial margins



By J. C. SULLIVAN
Pittsburgh Editor, STEEL

LACK of raw materials and components was the major hurdle the electrical home appliance manufacturers had to deal with in 1947. With the exception of steel sheets, however, a substantial improvement in supply of most production items had developed near the close of the year. Extended deliveries on large specially built machine tools and realigning of production facilities were additional factors retarding output.

Many appliance manufacturers contend lack of steel sheets was the key factor limiting production, stating output could easily have been increased up to 35 per cent but for this factor.

Sheet Supply Drying Up—One household appliance interest states hot-rolled sheet supply is "drying" up with cold-reduction mills absorbing an increasing proportion of hot-rolled tonnage. Cold-rolled sheet supply is a little better than hot-rolled, and inventories are said to be somewhat greater than last July or a year ago.

Some appliance manufacturers expect the supply situation in silicon sheets (used on electric motors) to remain very tight through first half of 1948, with gradual easing anticipated through the remainder of the year.

Production of enameling sheets is falling far short of meeting current requirements, and this situation is expected to become more critical in the months ahead. Some manufacturers have attempted to sub-

Electric range production last year approximated 950,000 *units,* 75 *per cent more than were produced in* 1946. *Shown at right is a range asembly line of an Ohio manufacturer which produces for a leading mail-order house*

Appliances

stitute cold-rolled sheets for enameling stock, but found it impossible to achieve desirable enamel finish. Aluminum also has been substituted for steel, and in some instances may continue to be used when steel is in greater supply.

Despite the retarding production factors, output of home appliances increased sharply last year and with one exception, among the major items, production topped that for 1941 by substantial margins. Estimates of 1947 output are not available for such items as electric clocks, coffee-makers, irons, toasters and waffle irons, but industry officials state substantial gains over 1941 output undoubtedly were recorded last year. Another indication of the current record production pace is the fact that employment is nearly 30 per cent above prewar peak in some instances.

To achieve this volume production in 1947 it was sometimes necessary to pay premium prices for steel and other materials, and it was also necessary to establish temporary assembly lines to maintain production while other operating facilities were being expanded or revamped to meet huge pent-up demand for home appliances; all of which sharply increased production costs.

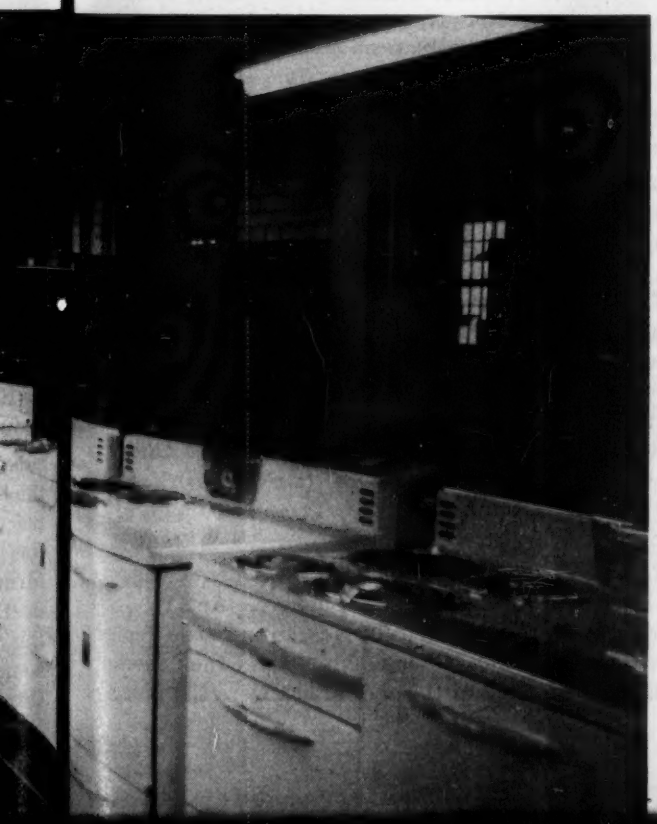
Operating Costs Up—Most interests do not anticipate much reduction in operating costs over coming months, for the steel shortage is expected to prevent substantial improvement in unit output. It is also pointed out that wage rates have risen over 90 per cent in some plants since prewar, and represent about 60 cents of each sales dollar revenue in some instances. Still higher wage levels appear in the offing with union demands for a third round of wage advances to meet rising living costs expected to come to a "show-down" next spring.

Price Reductions Unlikely—There is little prospect of price reductions until late next year at earliest in nearly all the home appliance lines. Of course there will be exceptions, such as in radios, for which prices already have been reduced on table models due to competitive conditions. No buyer resistance is indicated for most appliance items in present short supply.

An increasing competitive market for electrical household appliance items is indicated throughout 1948, although distribution of some major products is expected to remain on an allocation basis. This probably will be particularly true among the leading manufacturers with long standing records of quality products. The extent to which the appliance market will become competitive in 1948 is expected to largely depend on the trend in supply of flat-rolled steel. Estimated potential demand for such items as washing machines, ranges, and refrigerators represents 1 to 2 years' output at present production rates. However, the fact remains that current output exceeds incoming orders in some instances and the industry expects to cut sharply into its order backlogs.

Large Potential Demand—Potential foreign demand for electrical household appliances is very great, although amount of probable exports over coming years is difficult to evaluate for much depends on government controls, credit agreements, international relations and other factors.

Expansion Programs Completed—High construction costs have not materially delayed expansion programs of appliance manufacturers, as indicated by the fact nearly 90 per cent of the projects have been completed. As a result of this program and record output in recent months, the appliance industry is expected to be in a position of greatly expanded capacity and declining sales by middle of 1948 on some items, particularly in the radio and lighter appliance lines. This situation is expected to develop despite the probable withdrawal from the market of smaller lesser-known competitors. These interests are said to be at a competitive disadvantage because they do not have a wide product assortment which would make it possible for more profitable items to absorb losses of unprofitable products.



HOUSEHOLD APPLIANCE PRODUCTION

(Unit Output)

	1941	1946	1947*
Refrigerators	3,500,000	2,100,000	3,300,000
Washers	1,892,435	2,000,000	3,500,000
Vacuum Cleaners	2,053,510	2,243,600	3,500,000
Ironers	259,668	175,000	500,000
Ranges	728,000	544,000	950,000
Water Heaters	205,000	488,000	850,000
Home Freezers	.....	87,000	450,000
Toasters	2,640,840	3,500,000	NA
Irons	5,585,000	9,600,000	NA
Fans (Desk)	1,985,000	1,240,000	NA
Mixers	510,000	1,500,000	NA
Electric Space Heaters	564,000	2,000,000	NA
Hot Plates and Grills	547,800	2,000,000	NA
Waffle Irons	777,000	2,000,000	NA
Roasters	290,000	150,000	NA

*Estimated. NA—Not available.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

European aid and anti-inflation to be foremost problems of Congress. Action on domestic issues to be influenced by political considerations as members jockey for advantage in 1948 elections

ANTI-INFLATION measures and aid to Europe will overshadow all other problems as the second regular session of Congress convenes.

Overhauling the tax structure, filling in the chinks in the national defense setup, and a score of other matters are on the agenda, but major interest will focus on what can be done about rising prices and on the amount and manner of help to be extended foreign countries.

The European Recovery Program, aimed at rehabilitating the economies of 16 western European nations and forestalling the extension of communistic influences, may be expected to gain in urgency as a result of steadily deteriorating relations between the United States and Russia. Should these relations take a sharp turn for the worse, the differences of opinion on European aid may be swiftly compromised. If the status quo is maintained, the aid program may keep Congress in lively debate for weeks.

Battle Lines Drawn—Lines for the fight against rising prices already have been drawn. Both the administration and the Republican majority of Congress have advanced programs for inflation control and the campaign will be not only against inflation but also for votes in the 1948 elections.

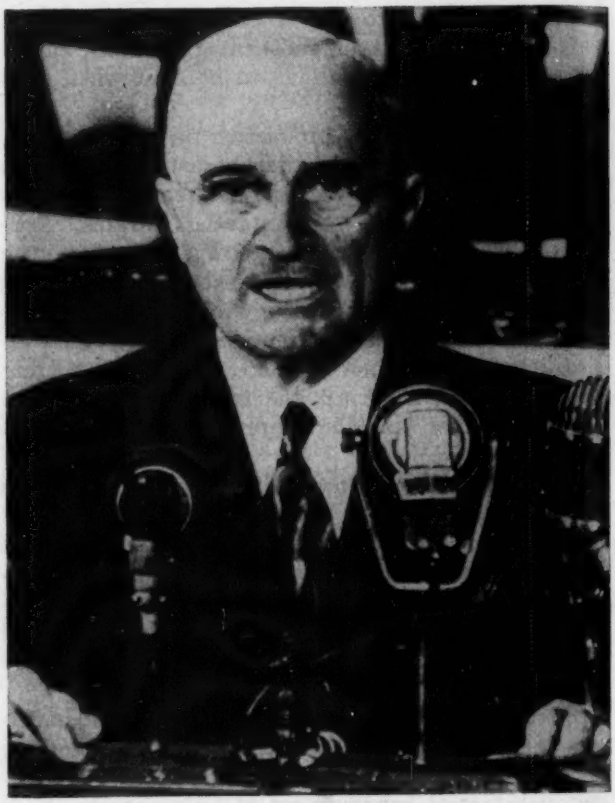
The administration's program was outlined to Congress by President Truman in his message to the special session Nov. 17. The 10-point program called for allocation and rationing powers, price and wage controls and certain credit powers.

The Republicans countered with a rival program, passed a stop-gap bill providing for amendment of the antitrust laws to permit voluntary allocations of scarce materials, extending export and transportation controls, and granting the President some slight additional power of food control, but held the major issues of credit restrictions, price and wage controls and compulsory allocations over to the regular session.

At the turn of the year, it was clear that the inflation issue is shaping up as a major factor in the 1948 political campaign.

Both Avoid Showdown—Neither the administration or the Republican programs, it may be pointed out, strike directly at the heart of the problem but rather snipe at the symptoms of the malady. Both parties are being extremely cautious about alienating the farm vote or the labor vote and any anti-inflation program to be effective must obviously strike at rising farm prices and rising wages.

Most Washington observers believe, however, that Congress will be forced to grant the administration



A 10-point anti-inflation program was asked of Congress by President Truman at the opening of the special session Nov. 17, but the problem was carried over to the regular session

certain control powers, regardless of their origin.

For the long pull, these observers believe that the economy may be subject to increasing government directions. As to what will come later, they cite a few highlights of history.

Three Eras—Development of government policies relation to business, it will be recalled, falls into three principal eras. The first involved the issue as to whether control of business was to be in the hands of the states or the federal government. That was settled when the Supreme Court in 1824, in the case of Gibbons vs. Ogden, denied to New York State the exclusive right to license steamships plying in her waters.

The second era was ushered in when Congress, in enacting the Interstate Commerce Act in 1887, made it illegal for the railroads to exercise freight rate discrimination among shippers. Other momentous developments in the second era were the passage

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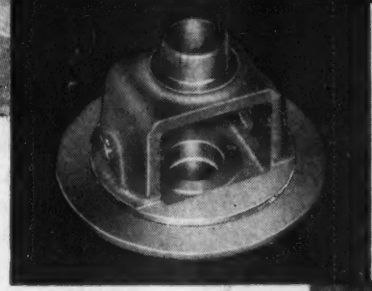
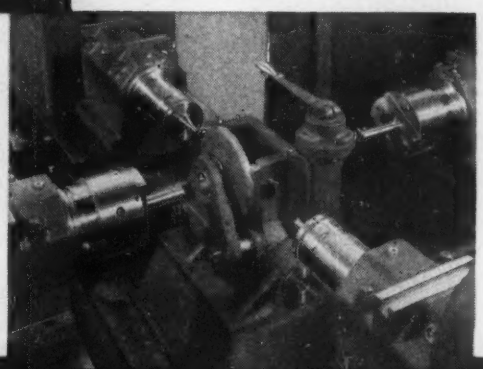
Note typical use of an Ex-Cell-O Way Machine to the right. Send for catalog with many varied applications—ask for Bulletin No. 31631.



Above: Ex-Cell-O Four Way Precision Boring Machine. The four way units are electrically interlocked and controlled from the push button station on the right front unit. *Left:* Malleable iron differential case in which two inside counterbores are finish bored and chamfered and two cross holes are bored.

Right: Close-up view of part in fixture and boring spindles. Note that boring bars on left front and right rear spindles are carried on tool slides that are retracted to allow tools to enter holes, are moved out to finish inside counterbores, and again retracted for withdrawal.



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of the Sherman Act in 1890 and, later, the Clayton Act.

Up until the Roosevelt administration, therefore, the main concern of the federal government, after it once had taken over dominance in this field from the states, was a dual one: To protect business in general from the restraints of monopolies, and to protect the public from price fixing either by conspiracy or by monopoly or by any other unauthorized method.

Objectives Broadened—The third era, the one that was ushered in with Roosevelt, and the one that now is on its way to a culmination whose complexion is not yet clearly revealed but whose implications give the business world cold shudders, took root in the blackest depression in our history. The world's most highly industrialized nation was faced with economic ruin, and millions of its people with starvation. Everybody looked to Roosevelt for help, and many things had to be done in a hurry. Mistakes were made galore, and there is no doubt at all but that millions of dollars were spent wastefully. But out of the experience came a philosophy which embodies these major points:

1—Extreme cyclical depressions must not be permitted in the future.

2—The nation's economy must function in the interest of all its citizens.

3—To achieve these first two objectives, the nation's productivity and employment must be kept at a high level.

4—Private business must be relied on to furnish the great bulk of the employment with the benefit of needed federal government assistance and supervision.

Chief critic of the administration in domestic affairs is Sen. Robert A. Taft, Presidential candidate and a leading spokesman for the Republican majority

Nonpartisan—There is nothing partisan about this program; it is shared by Republicans and Democrats alike. The unfortunate thing is that while the objectives are noble, there is no guarantee as to the means and spirit in which the progress toward them will be made. The picture is badly cluttered up with adverse factors. First, despite the NRA experience, the voluminous findings of the old Temporary National Economic Committee, and the experience with controls during World War II, there is a lot of ignorance in the government as to exactly how to go about keeping business and employment at high levels and prevent disastrous future depressions. Second, the situation is complicated by the arguments of many minority groups who want something for their constituents at the expense of the nation as a whole. Third, many of the people in a place to influence the making of national policies are prejudiced—against big business, against profits, against the socalled classes as contrasted with the masses, or they are steamed up over some particular pet subject which really is but a small issue in setting overall policies.

Control-Minded—The thing that particularly worries business observers in Washington is the freedom with which the highest government officials talk about curbing the profits of corporations. Both in 1946 and 1947 President Truman, it will be recalled, called for wage increases without higher prices, the proposed extra wages to be taken out of the corporation profits.

The same point of view was expressed recently by Leon Henderson when he undertook to explain, in a question and answer session, what sort of a price and allocation control setup the government needs at this time. Needed, said Mr. Henderson, is a new "peacetime resources board" with full power over wages and prices, exports, rents, consumer rationing, industrial and banking credits, and allocation of materials to industry.

Social Security Extension—In accordance with the promise of the Republican leadership in January, 1947, the 1948 session will take up proposed legislation in the fields of social security, and public welfare generally. There is a chance Congress may go as far as to pass the Taft-Fulbright bill calling for a new Department of Welfare, Education & Security with cabinet rank. It is expected that 1948 will finally see all workers in the United States enrolled under the social security program. That means the addition of some 19 million farm hands, domestic workers, self-employed persons, migrant workers and others. The way for action has been cleared to a large extent by a Treasury Department report which says that as a result of the experience over

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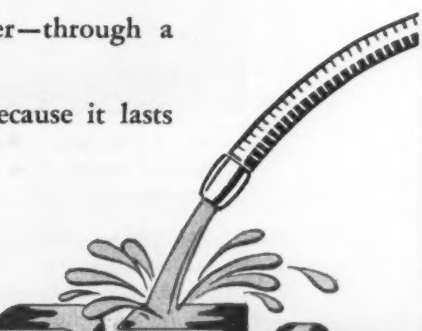

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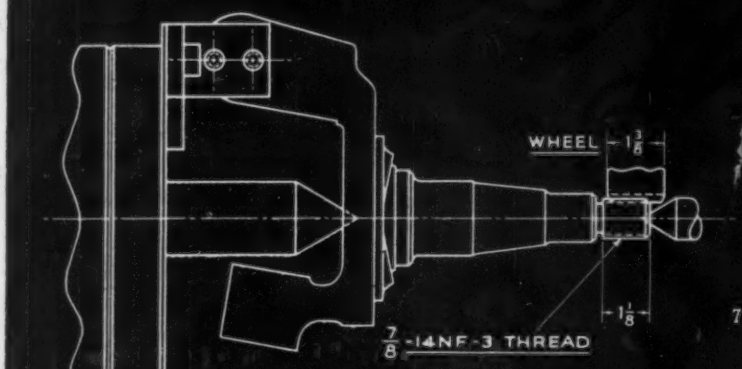

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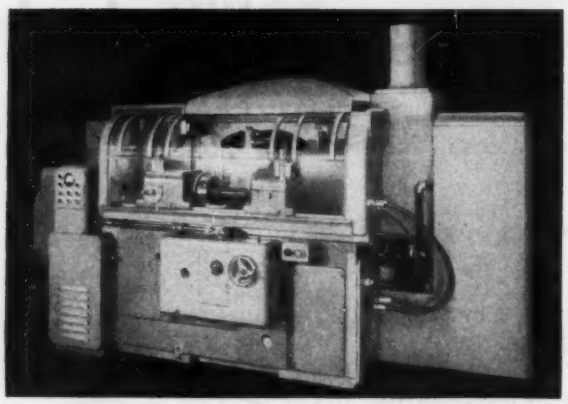

An outstanding advance in automatic thread grinder design. The 6 x 30" production thread grinder has—

Universal Thread Range	Perfected vapor control
Complete versatility	Wide speed range
Crush or Diamond Dressing	Roomy working area
Automatic guarding	Selective automatic cycles

THINK what you could save with *any one* of these advantages

- • No handling damage — the thread is ground last
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The Jones & Lamson 6 x 30" Production Thread Grinder provides *ALL FOUR*—and guarantees high production of fine quality threads in even the toughest, hardest materials.

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AUTOMATIC THREAD GRINDERS

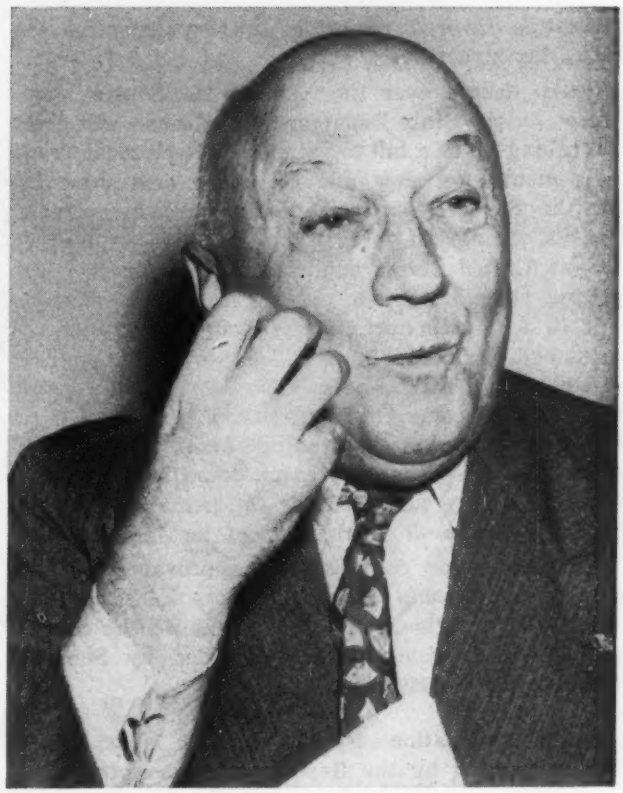
10 years "administrative considerations no longer constitute important barriers to coverage." The report sets forth no fewer than three methods by which the government can keep the necessary accounts without adding an undue number of employees. One is a stamp-purchase plan by which the employer of casual or migrant help can make social security payments without keeping any records at all. One feature is that it would remove some present obstacles to putting people on payrolls.

Congress also, in considering social security legislation, will rely strongly on the coming report of an advisory council of 17 appointed by the Senate Finance Committee to look into the whole subject. Heading the council is Edward R. Stettinius Jr., former secretary of state and former chairman, United States Steel Corp. Vice chairman is Dr. Sumner H. Schlichter, Harvard professor who also is chairman of the research advisory board of the Committee for Economic Development. The council is bipartisan and should make a report free of any political bias.

Public Health—Also due for adoption is some sort of a public health bill to fall between the two extremes represented by the Wagner-Murray-Dingell and Taft-Ball-Smith bills. The former, widely hailed as paving the way to "socialized and nationalized medicine," would require an annual outlay of $3 billion to $5 billion to be met mainly out of new payroll taxes. The latter bill, calling for $250 million of federal funds annually, is aimed at aiding the states in furnishing medical, surgical and dental service to low-income families and especially children. Some sort of a health program has been regarded as a "must" ever since it was found in World War II that an appalling number of our young men are unfit for military service because of lack of medical attention in their formative years.

Antidiscrimination Laws Likely—Legislation to outlaw racial bias is high in the order of priority and the least that is expected of a combination of Republicans and northern Democrats is enactment of an antilynching law and banning of the poll tax as a voting prerequisite. Spearhead in the drive for action is the recent report of the President's Committee on Civil Rights headed by Charles E. Wilson, president, General Electric Co. Our treatment of colored people, says the report, makes us a shining target for criticism among all the black and brown peoples of the world—and the Russians are making the most of this opportunity.

Tax Action Uncertain—Outlook for tax action by Congress this year is uncertain. The Republican leadership has expressed some objection to the plan of Chairman Harold Knutson (Rep., Minn.) of the Ways & Means Committee to drop a tax reduction bill in the hopper at the outset; Mr. Knutson had hoped that by permitting split returns by all married couples his new bill would attract enough Democratic votes to override another veto. Some leading Republicans now think that introduction of a tax-reduction bill should be held over until such time as Congress



Tax revision falls within the province of Rep. Harold A. Knutson of Minnesota, chairman of the House Ways & Means Committee

has a definite idea as to how much expenditure will be added by the foreign aid plan, long-range as well as short-range. The situation has been further complicated by strong objections of such Democratic leaders as Senator George and Representative Doughton to pushing through tax reduction as a political move. These congressmen have indicated that they may want to go along with the Republicans if the reduction is set at a somewhat lower target—$3 billion cut instead of the $4 billion cut which Knutson has demanded.

The outlook for a revised general revenue bill also needs clarification. Mr. Knutson and some of his associates on the Ways & Means Committee were much pleased with recent recommendations from the committee's advisory group headed by Roswell Magill but have been disturbed by widely publicized criticisms of the program as intended to help "rich men."

Magill Recommendations—The Magill committee recommended elimination of double taxation on corporate earnings—once on profits and again on dividends—and accelerated depreciation of industrial machinery with the object of stimulating continued modernization. Another change would protect private industry from the competition of tax-exempt co-operatives.

Later the Committee for Economic Development came up with recommendations that were substantially the same as proposed by the Magill group except for excise taxes. The CED report proposed an early end to all excise taxes, whereas the Magill

committee favored retention and expansion of the excise tax structure.

Sharp debate over the reduced tariff rates engineered by the State Department at Geneva will greet the calling up of a bill to extend the Reciprocal Trade Agreements Act now due to expire next June 30, for the State Department really went to town at Geneva. It agreed to tariff cuts on 75 per cent of prewar United States imports, and congressmen are getting complaints that employers in their districts will be seriously hurt. While Congress is expected to extend the act, it may add a provision requiring congressional ratification before any future trade treaty can become effective; that might mean a resumption of the old "log-rolling" tariff policy. In the meantime, the Geneva program is on ice; the rates agreed to there are good for the period covered by the agreements—3 years in most instances.

Chances favor congressional approval of United States membership in the proposed International Trade Organization, particularly because the charter contains the provisions recommended by Senators Vandenberg and Milliken.

Labor Legislation—No more major labor legislation is wanted by the Republican leaders from this Congress; they think the practical course is to observe how the Taft-Hartley Act will stand the test of experience. However, Chairman Fred A. Hartley (Rep., N. J.) of the House Education & Labor Committee has one more ambition he would like to achieve before he retires without running for reelection in 1948. He would like to put through a bill making it a federal offense to interfere with any man's right to work. He has no bill ready, and is not sure whether this proposal should be added to the Taft-Hartley Act or to the criminal code. He has set Jan. 19 to start hearings on this subject. Following the example of other congressional committees, his first witness will be a Hollywood star—Cecil B. DeMille who is to tell the story of how organized labor drove him off the air as a radio producer-announcer.

Building Volume High—Outlook for housing legislation depends largely on whether the Republican leadership thinks such legislation still is necessary. As a matter of fact, house building now is at a record volume and the emphasis now is not on volume but on cost of housing. In this connection, practically every legislator who embarks on a housing investigation comes up with the conclusion that housing costs are too high and that the government must do something to help the low-income families on this problem. Senator Taft came to that conclusion when he served on a housing subcommittee some years back. Now Senator McCarthy, who has been active as vice chairman of the Joint Congressional Committee on Housing feels the same way.

"The average wage of returned veterans runs $42 or $43 a week, and that means 4, 5 or 6 millions are making somewhere around $35 a week," says Senator McCarthy. "Private industry says it can't build new rental units for $35 a month. Much as I dislike federal subsidies. I think we will have to provide some government help."

The only omnibus housing bill, the T-E-W (Taft-Ellender-Wagner) bill, is still pending; this is the one that has been widely characterized by the construction and mortgage banking businesses as "unsound, wasteful and tending toward socialism." It has many features covering proposed government activities in the housing field and would commit the government to the expenditure of approximately $7 billion on low-cost housing over a period of 45 years. Another bill that will get consideration is that of the American Legion for a government Veterans Homestead Administration which would enable veterans to get homes at approximately 25 cent under current market values.

Wage-Hour Act May Be Amended—A likelihood is amendment of the Fair Labor Standards Act so as to set up more definite policies for the wage-hour administrator. For example, the administrator has ruled that payments out of profit-sharing plans are a part of wages, but the Internal Revenue Bureau holds the opposite view. And Justice Department has asked the Supreme Court to throw out the wage-hour administrator's ruling that overtime paid to stevedores during the war was part of their regular wages and that overtime should be calculated on that basis; this is another problem on the order of the "portal-to-portal" case.

The Agenda—Other bills on the calendar for 1948 action are the following:

Kefauver bill to close a legal loophole by prohibiting a corporation from acquiring physical properties of a competing corporation for monopoly purpose; the law now covers security transactions only.

A bill to extend the Reconstruction Finance Corp. beyond June 30, 1948, and to define this organization's future duties.

A bill to give Clayton Act immunity to parties to trade practice agreements sponsored by the Federal Trade Commission.

St. Lawrence Seaway Project. A report is due early in January from the Senate Foreign Relations Committee.

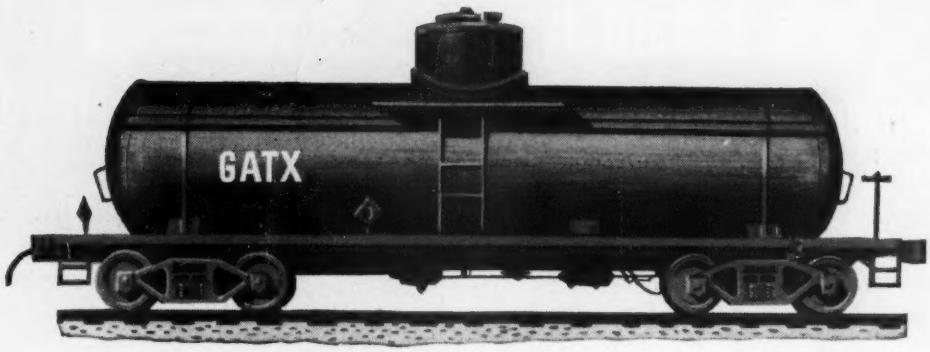
A stream pollution bill which passed the Senate and is pending in the House; this is aimed at preventing pollution of streams by industrial plants.

Repealer of the profit limitation provisions of the Vinson-Trammell Act; this passed the House and is pending in the Senate.

Action on an aviation policy report to be submitted by the President's Air Policy Commission.

A bill, vetoed by President Truman Aug. 8, to encourage mineral production under a government subsidy program aimed chiefly at helping western miners.

A new National Science Foundation bill to replace the one vetoed by President Truman. There is less interest in this legislation in Congress than before, and shaping up of another bill will depend largely on recommendations from military authorities, scientists and land-grant colleges.



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new Bullard type "K" economies widen scope of MULT-AU-MATIC method

Higher Speeds Meet New Job Requirements. Designed to lower production costs of small and medium sized jobs in cast iron, steel and light metal alloys, the new BULLARD Type "K" Mult-Au-Matic provides a wide range of spindle speeds up to 900 rpm to get full productive capacity out of modern cutting tools.

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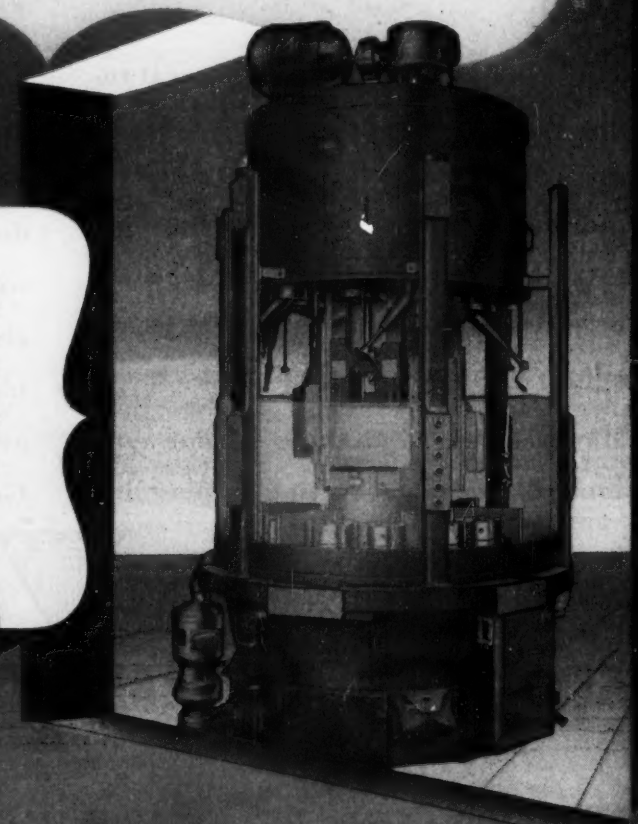
Improved Hydraulic Chucking Increases Efficiency. Work is chucked quickly by foot treadle control and automatically released as spindles return to loading station. Chucking pressure is adjustable to suit work characteristics.

Twin Spindles Double Production. Two of the four Type "K" models have twin spindles that deliver two finished pieces for every index cycle . . . a promise of lower production cost that is worth investigating further.

Write for complete information about the new Type "K" version of the Mult-Au-Matic method, one of the leading contributors to our modern American production system. THE BULLARD COMPANY, Bridgeport 2, Connecticut.



BULLARD Type "K" Mult-Au-Matics for work up to 10" in diameter come in four models: 6 or 12 spindles with speeds from 100 to 900 rpm, and 8 or 16 spindles with speeds from 98 to 880 rpm. 41 speed changes, 82 rates of feed, selective feeds and common speeds at all stations.

BULLARD

BULLARD CREATES *NEW METHODS* TO MAKE MACHINES DO MORE

Mirrors of Motordom

By A. H. ALLEN *Detroit Editor, STEEL*

Materials shortages chief problem of automakers in 1947, but production approximates 5,000,000 units. Steel drouth to continue through coming year. Design, mechanical changes reviewed

Body sheets are formed on large stamping press at Ford Motor Co.

DETROIT

TWELVE months of automotive production at levels close to the industry's historic highs (see p. 141), unmarked by any serious strikes or work stoppages, and accompanied by profits which, with few exceptions, were average or a little better in terms of percentage of net sales, should have engendered pleasant feelings of a job well done among automotive officialdom as it paused for a brief retrospective glance at year-end.

Yet, perhaps symptomatic of the times, such was not the case. Instead there were continued grumblings over inability to corral enough steel; frightened glances were cast at the still-inflating economy; ambitious new tooling programs either were being scaled back or held in abeyance; valiant efforts were being made to placate irate customers who felt dealers were "throwing the book" at them pricewise; and grave misgivings were being voiced over the possible impact of a gargantuan foreign-aid program on basic materials supplies for 1948.

As if these were not enough, the worry mills could also contemplate the possibilities of CIO unions forcing another round of wage increases through basic industries this spring.

Gripes Aplenty—Loudest of the auto industry's complaints has been directed toward steel. The mills were playing favorites in their allocations of tonnage. The industry was not receiving its historic share. Steel plants were not expanding capacity fast enough. Small sheet mills were being gobbled up by manufacturers and their automotive customers tossed out in the cold. Mills were not making enough hot-rolled and were forcing customers to accept more expensive cold-rolled sheets and strip. Too many extras were being tacked onto base prices. Costs of converting scrap to ingots in electric furnace plants and then rolling to sheet and strip somewhere else were understandably fantastic. And so on.

A brief glance at the record belies many of these gripes. Of the 62.5 million tons of finished steel rolled last year, the auto industry received a little better than 14 per cent, or 12 per cent more than it garnered last year, leading all other steel consumer groups. Nearly 29 per cent of the hot-rolled sheets and 45 per cent of the cold-rolled sheets produced were shipped to automotive customers, and a grand total of close to 8.7 million tons of all types of steel produced last year was classified as automotive. On the basis of 5 million units of production this figures to 3472 pounds per vehicle, taking no consideration of the large volume of steel going into replacement parts fabrication which, in dollar volume was 28 per cent ahead of last year and 4½ times the prewar level.

Steel Drouth To Continue—Although automotive steel tonnage last year in all probability hit an all-time high, it was not enough, and on the basis of current thinking in both the steel and motor industries the drouth will prevail this year and possibly next, even recognizing the 3 million tons of additional capacity for flat-rolled products scheduled to be operating in 1947 and 1948. Guarded forecasts from the larger manufacturers around Detroit indicate they expect little more than 10 per cent improvement this year over last on the basis of the steel outlook.

It should not be inferred the automotive and parts industries are at all bitter in their recriminations against too little steel. In general many feel a reasonable effort has been made to distribute equitably the tonnage available, and they recognize the time factor involved in stepping up melting and

rolling capacity. Meanwhile, there has been no tendency to sit back in resignation. Bold, and at times even frantic steps have been taken to locate additional steel supplies. Three principal avenues have been followed—scrap conversion to ingots in electric furnaces; swapping of one type of steel for another, one size for another, pig iron for steel, etc.; and substitution of aluminum for steel.

Ingot Conversion—In the matter of ingot conversions, one source close to the picture, estimates about 100,000 tons a month are being processed on automotive accounts. At least half a dozen steel companies operating electric furnaces have taken on portions of this business, some to the virtual exclusion of their normal operating pattern. One result has been a scramble for suitable scrap, pushing the price of such material often to $45 per ton or more, well above the market price. By the time a $40 charge for conversion to ingots, a similar amount for rolling the ingots to sheets and all the devious freight and handling costs have been added on, the resulting sheets may cost in the neighborhood of $200 a ton. Obviously no company in its right mind is going to continue building automobiles very long with 10c-per-pound steel. Emergency situations have been the only justification for the expenditures.

Swaps—No figures are available on the amount of steel being moved on exchange arrangements between users. Numerous instances have been reported where different sizes have been swapped to make available for one manufacturer some extra wide sheets in exchange for narrower sizes; where pig iron has been exchanged for steel, or pig iron has been supplied to foundries to guarantee a castings production order.

Aluminum Substituted — Scattered instances of substituting aluminum for flat-rolled steel have been publicized. Ford has switched running boards, headlamp housings and one or two other parts to aluminum, and is studying the possibility of changing a couple hundred other parts. Kaiser-Frazer has changed from steel to aluminum in gasoline tanks. Some designers, possibly at the instigation of the large suppliers, are urging outright replacement of steel with aluminum, not any interim substitution. No such trend has developed, for one thing because of the manufacturing problems involved, including difficulties incident to effective welding of aluminum, finishing and painting, and scrap segregation.

Outlook at the moment is for a greater usage of aluminum, both rolled and cast, in automobiles, but for continued reliance on steel and cast iron as basic materials.

Demand To Last—What of demand for passenger cars and trucks over the next year or two, and when will the normal buyers' market return? The two questions are, of course, inter-related and the answers doubtless will prove different for each individual manufacturer. As far as demand is concerned, no student of the automotive market professes to see anything but unlimited lines of buyers for passenger cars until well into 1949.

A similar situation prevails in the truck field, although some softening in orders for larger and heavier units has been experienced, and it is the feeling that the record truck production of 1947—something over 1,300,000—will not be exceeded this year. In passing, it might be noted the three largest truck builders have introduced new models in recent months, a possible indication of efforts to whip up jaded appetites of truck buyers, although this is hardly credible in the light of current order backlogs.

Independents Gain — The so-called independent group of passenger cars and truck builders, those outside the Big Three, have been reaping a postwar bonanza in sales, and chances are they will be the

Long, low and wide is typical of the new models. Shown here is the 1948 *Packard station sedan*

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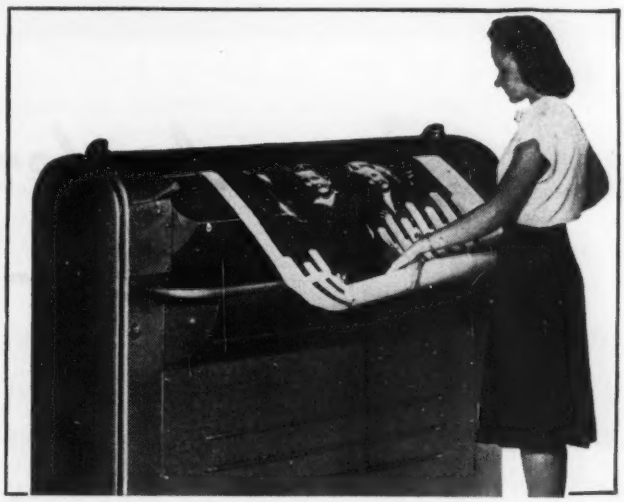

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Bulova Watch Company	Pan American Airways, Inc.
Chris Craft Corporation	Paramount Pictures, Inc.
Chrysler Corp.	Parke, Davis & Co.
Columbia Broadcasting System	Pittsburgh Plate Glass Co.
Dun & Bradstreet	Remington Rand
E. I. DuPont	Scovill Manufacturing Co.
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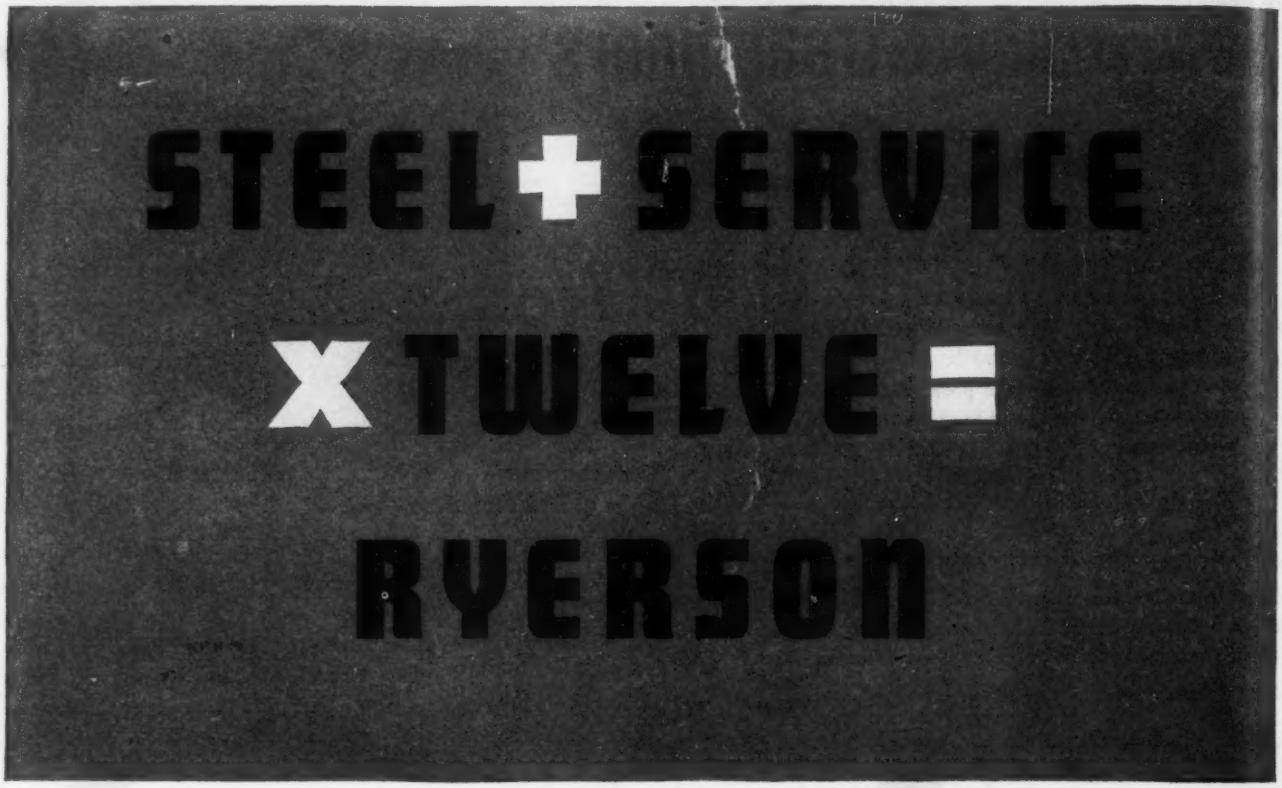

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first to experience a tapering in demand. Prior to the war these companies accounted for 9-11 per cent of total sales. In 1946, their proportion mounted sharply to about 16 per cent, and again last year to an estimated 20 per cent. As General Motors, Ford and Chrysler production moves ahead, the pressure on the independents will build up and their share of total sales obviously must go down. There are only two major counts on which they can outperform the larger manufacturers—style and mechanical innovations. As far as sales promotion, price and service are concerned, the Big Three have a wide advantage.

The independents appreciate this and it is one of the explanations behind the fact the only new models to appear last year were those of the smaller builders—Packard and Hudson entirely new and the rest slightly restyled. A year ago it was the expectation around Detroit there would be entirely new 1948 models almost right down the line. Then General Motors called off an extensive tooling program for Chevrolet, Pontiac and Olds bodies, possibly after learning of the ambitious redesign which Ford decided to undertake. Chrysler evinced little interest in major tooling throughout the year, signaling its decision to carry through with no changes. The size and extent of the Ford program enforced repeated postponements and at latest word it will be spring before the Lincoln-Mercury-Ford line is unveiled. General Motors did proceed with a new series of bodies for Cadillac, Oldsmobile and Buick, but a few months ago Buick decided to suspend its projected use of the design, and Olds will limit it to a single model.

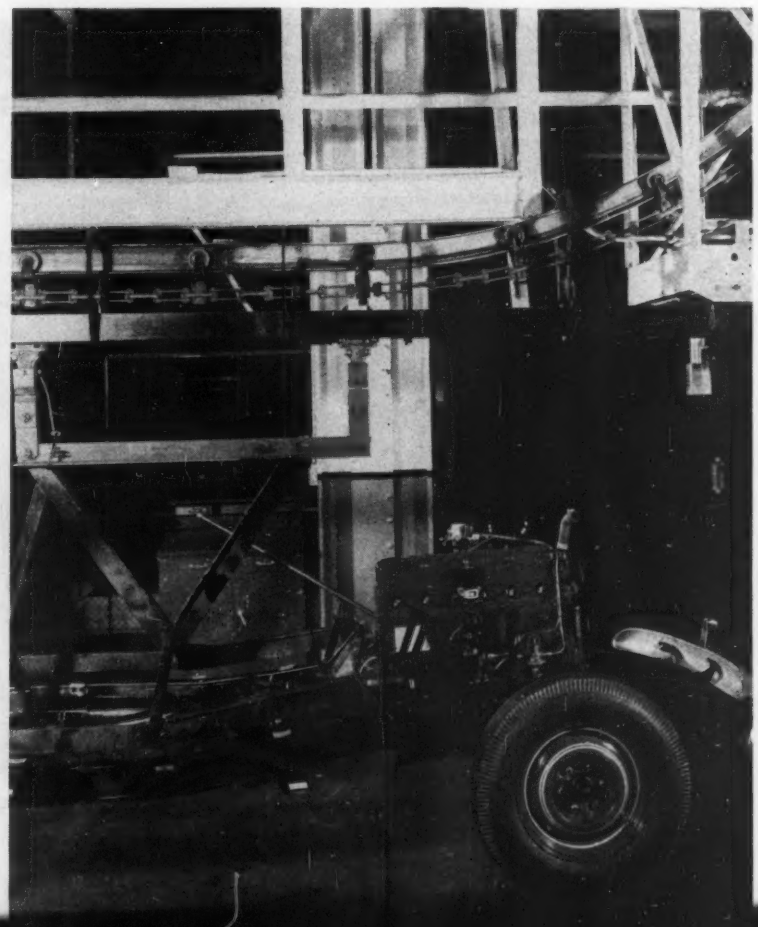
Tooling Costs Up—Thus the Big Three have decided to "pour it on" while the market is there and to spread out new tooling to the limit. The logic of such a policy becomes apparent when consideration is given to the cost of tool and die construction—from two to three times prewar—and to the fact an outlay for a series of, say, seven or eight body styles may come to $50 million. Assignment of a new tooling charge, on top of sharply higher materials costs and labor rates, would mean another appreciable boost in prices for 1948 models. For proof it is only necessary to look at the new prices on Hudson, which average about 11 per cent higher than last year. A good share of this is chalked up against the $16 million which Hudson spent on completely new tooling and plant rearrangement. On the other hand, General Motors has stated its 1948 model prices will range from no increase to a maximum of 5 per cent.

Long, Low and Wide — Design and construction trends in passenger car models should be of particular concern to the metalworking industry since they chart the course of future orders for a wide range of materials and the full complement of plant equipment, from machine tools and presses all the way through to the simplest conveyor mechanism. The five basic components, now either in process of change or destined to be redesigned are: Bodies, engines, transmission and drive, frame and chassis, and wheels-tires-suspension systems.

The "new look" in bodies, as in women's dresses, is long, low and wide. Counter to the dress styling, it may be noted, is improved vision and ventilation. Blending of fenders into body lines is a universal trend which permits wider seats but at the same time multiplies the vulnerability of wide expanses of body side to damage from swinging doors of adjacent cars. Extra body length with no increase in overall car length is possible by pulling front and rear bumpers in close to the body line. Curved glass in front windshields, pioneered by Hudson, yields broader vision and cuts reflections; it should be widely copied by other manufacturers. Spraying of underbodies with asphalt-type paint to deaden sound and seal against corrosion may well become standard practice.

Higher Compression Engines—Thanks to extended and painstaking research by C. F. Kettering and his associates in General Motors Research Laboratories in the field of high-compression engines and the high-octane fuels required to power them, the future course of the automobile engine over the next 5 to 10 years is pointed definitely in the direction of engines designed to a compression ratio of 12.5 to 1 and using the equivalent of perhaps a 100-octane gasoline.

Experimental engines of this type already built and



Suspended assembly line at Chevrolet-Flint features the "power and free" system, whereby power chain automatically engages and disengages. Picture shows power chain lifting away from monorail, with the power lug being disengaged from the socket on carrier. From this point the carrier can be moved by hand

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by Bridgeport Brass Co. "Bridgeport" BRASS CO. *Headquarters for BRASS, BRONZE and COPPER*

Brass and Copper Mill Products Outlook for 1948

What has 1948 in store for users of brass and copper mill products? Obviously it is difficult to foresee the future twelve months ahead inasmuch as we are faced with so many world-stirring factors that are unpredictable in nature. Perhaps a review of past events and their effect on both our industry and company will be helpful in preparing ourselves for things to come.

Looking back, 1947 has been an eventful year for the brass business. During the first half our industry was flooded with an avalanche of orders. This greatly hampered deliveries and permitted the backlog to rise to fantastic heights.

This abnormal situation can probably be explained as follows. The desire to fill the unprecedented demand for consumer goods caused manufacturers, in many cases, to double their prewar requirements for brass mill products. As a result all mills were choked with orders that they could not fill in a reasonable time. The combination of rising prices, shortages of metals and excessively slow deliveries caused manufacturers to place heavy orders for delivery many months ahead. When buyers finally realized that inventories could rise beyond reason if all standing orders were completed, buying was halted. All outstanding orders were reviewed and many were cancelled. The swing in the opposite direction left the mills with insufficient orders for normal operation. However the mills were given the opportunity to fill existing orders more promptly. During the summer months excessive manufacturers' inventories were greatly reduced and more normal buying was resumed, for the fourth quarter.

The Importance of New and Better Alloys

From an engineering standpoint much has been accomplished by industry. The war gave many an opportunity to go into new lines which required a variety of new processes and new materials. This experience has been of inestimable value during the reconversion period when they returned to the manufacture of consumer products. Those who went back to their prewar lines in many cases made definite improvements. Metal specifications were changed for stronger, more corrosion resisting metals which had proved themselves during the war. More attention has been given to reducing maintenance by using materials that are more resistant to destruction from corrosive elements. The war also showed the advantages of quality products over shoddy ones and design engineers have been more careful to avoid the mistakes of the past.

Difficult corrosion problems have been solved by using new types of tubing. The greater use of continuous processes emphasizes the need for more careful selections of metals for all component parts.

Increased Production Facilities

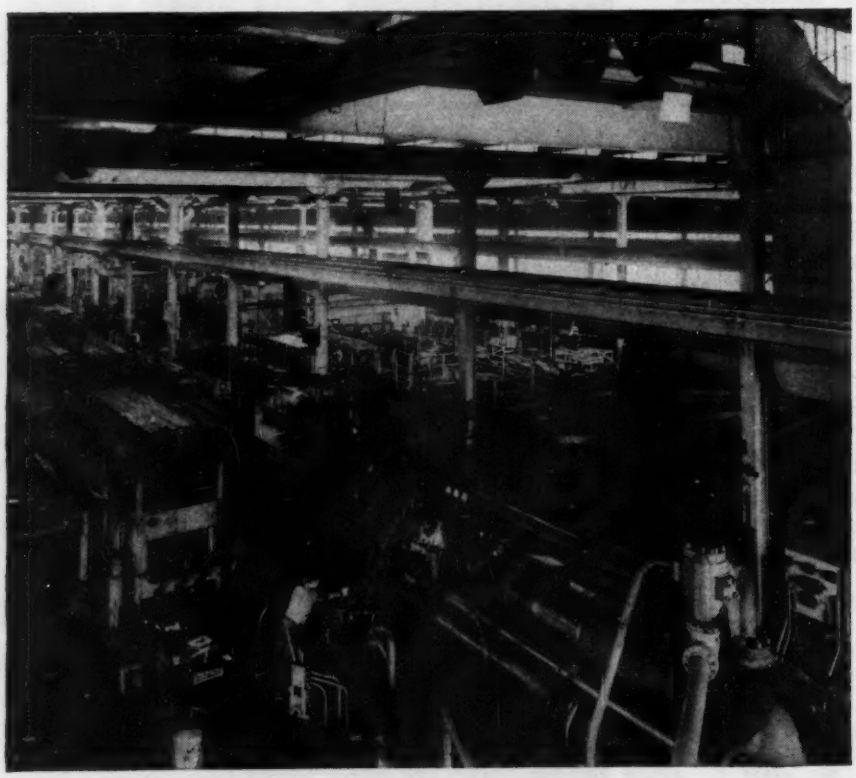
At Bridgeport Brass, the past year represents the consolidation of the gains which were made during and after the war. The program of reconversion and expansion was completed. At Bridgeport a larger and more modern rod and wire department was set up. The tube mill was also improved by the addition of more powerful draw benches and the latest types of annealing equipment.

Much progress has also been made in our Indianapolis plant which was purchased from the Government early in the year. The equipment which has been added has greatly increased the range of sizes and gauges of sheet, rod and wire production. Copper tubing was also added to the line of products. The Indianapolis mill is doing a splendid job serving industry in the Midwest.

Our nation-wide sales facilities have also been strengthened. Larger and more complete stocks and the addition of slitting equipment in most of our warehouses are helping customers who require immediate shipments of limited quantities of sheet, rod, wire or tubing.

Our Laboratory has been very active because of the many problems which have faced our customers during the reconversion period. They have found that many delays, waste of materials and excessive rejects can be avoided by drawing on its experience of many years in the manufacture and fabrication of copper-base alloys.

As to the outlook for 1948, Bridgeport Brass Co. with its substantially increased resources—in skilled manpower, plants and equipment—has never been in a better position to serve metal fabricators.

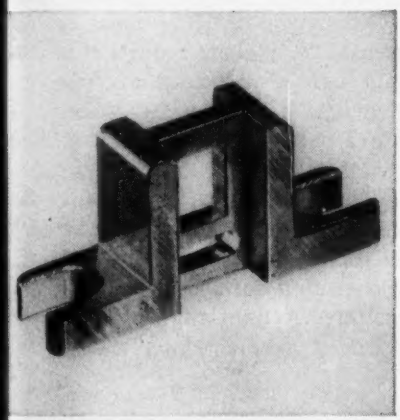


Bridgeport's new rod and wire mill is the most modern in the industry

Duronze III* Aluminum Bronze For Paper Mill Has High Corrosion-Resistance

The ability of Duronze III Aluminum Bronze to stand up to severe corrosive conditions is demonstrated by its excellent performance in many types of paper and pulp mill equipment. When A. E. Broughton and Company designed a water-driven, water-lubricated oscillating shower, they selected materials for maximum corrosion, erosion and abrasion resistance. A typical part is the Duronze III machined fitting, illustrated below, which meets all these requirements.

Duronze III is harder than brass and has a high resistance to wear resulting from abrasion or friction in contact with slow-moving parts made from other metals. It also stands up better than brass or copper when subjected to dilute acids, sea water, industrial wastes and the many liquids encountered in the process industries.

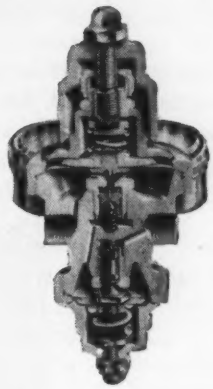


Duronze III fitting for Broughton Oscillating Shower, courtesy A. E. Broughton & Co., Glens Falls, New York.

Another advantage from the standpoint of fabricating economy is its excellent machinability – 50% to 70% as fast as free-cutting brass rod. Duronze III Aluminum Bronze also has good hot-working characteristics. It is generally supplied in rod form for making high-strength screw machine products and fabricating strong hot forgings. It is outstanding for use in sewage disposal equipment, pulp and paper mills, breweries, salt refining; in marine hardware; in bolts, nuts and tie rods used for pickling tanks; and in forged or cast valve bodies for water, oil, steam and gases.

*Reg. U. S. Pat Off.

Brass For Precision Parts



Cut-away section of an oxy-acetylene and gas-air unit. Courtesy: National Welding Equipment Co.

In welding equipment, proper control of mixtures and pressures is vital. The oxy-acetylene and gas-air unit illustrated, made by the National Welding Equipment Company, requires very closely dimensioned components to control the flow of gas and air from high-pressure cylinders. An exceptionally high quality and productivity level is maintained in the manufacture of these units, through use of the finest brass mill products for automatic production on up-to-date machine tools.

Modern, high-speed production of such precision parts is possible by carefully controlling the uniformity of the rod, viz.: composition, temper and finish.

On one automatic chucking unit, for instance, large diameter brass rod is turned into finished valve or regulator bodies in a matter of seconds, complete with precision-cut threads and finely-machined interior surfaces. Many parts of cylinder regulators are produced by a succession of turning, boring, drilling and tapping operations. It is interesting to note that the regulator screw is made from Duronze III aluminum bronze rod.

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

Electric Contouring Device is reported to perform complete range of duplicating operations such as straight facing and turning, tapers, shoulders, necking, concave and convex surfaces and spherical surfaces to an accuracy of .0015" to .002". Operates on standard 60-cycle, 115-volt circuit. **No. 813**

Electronics Metal Comparator, recently announced, is said to sort rapidly supplies of metal objects such as rods, pipes, nuts, bolts, etc. It can separate different grades of steel and brass screws from brass-coated screws, sterling silver from silver plate, etc. Similar objects of uncertain composition can be distinguished. **No. 814**

Automatic Cut-Off Machine feeds pipe and tube by motor driven rolls through hollow spindle against an adjustable receding target. A rotating head cuts work to required length. Production is claimed to be 1500 pieces per hour, depending upon composition of stock, wall thickness and diameter. **No. 815**

Removal of Chips and sediment from cutting oils and coolants is said to be accomplished by new unit continuously and automatically without removing fluid. Endless link chain operates through V-bottom of settling tank at 2 to 3 feet per minute. **No. 816**

New Bench Vise, which is reported to hold objects ranging from .001" to 2½" whether disks, gears, balls, half balls, medallion hobs, etc., is recommended for use in cutting, filing and fitting of small punches, dies and templates. Workpieces of odd shapes are handled by means of tool steel fingers. **No. 817**

Lathe Taper Attachment is said to handle lengths up to 16" which can be tapered 4" per foot and 20 deg. maximum in either direction in one setting. In two sizes of 34 and 40 inches between arms, for lathes with 13 to 26 inch swing. **No. 818**

Precision Grinder includes optical system which projects image of work in natural position, allowing operator to observe work while operating micrometer wheels. Remote movement of wheel head is accomplished hydraulically. **No. 819**

Pipe Fitting Machine will cut, chamfer, ream and thread piping from ½ to 2 inches in size without need for die change. Auxiliary equipment gives it range from ⅛ to 12". Unit is readily portable for installation and maintenance work. **No. 820**

BRASS, BRONZE, COPPER, DURONZE, NICKEL SILVER, CUPRO NICKEL

Warehouse Service with Slitting Facilities in Principal Cities

STRIP AND SHEET – For drawing, stamping, forming, spinning. Leaded alloys for machining, drilling, tapping. Silicon bronze, phosphor bronze for corrosion resistance. Alloys suitable for springs. Engravers' copper and brass.

WIRE – Cold Heading alloys for screws, bolts, nuts, nails, fastenings, electrical connectors. Phono-Electric trolley and contact wires.

ROD – Alloys for screw machine operation. Duronze III high strength, corrosion-resistant, good for machining and hot forging. Hot forging and cold heading alloys. Welding Rods. Copper-covered ground rod.

TUBING – For miscellaneous fabrication. For condensers and heat exchangers. For water, air, oil and hydraulic lines.

DUPLEX TUBING – for conditions too severe for a single metal or alloy.

PIPE – Brass and copper for plumbing.

FABRICATED GOODS – Plumbing brass goods. Radiator air valves. Aer-a-sol insecticide dispensers. Automobile tire valves.

TECHNICAL SERVICE – Staff of experienced, laboratory-trained men available to help customers with their metal problems.

WAREHOUSE SERVICE – Warehouse and jobbers stocks available for prompt delivery in principal cities.

TECHNICAL LITERATURE – Manuals and handbooks available for most products.

"Bridgeport" BRASS

BRIDGEPORT BRASS

BRIDGEPORT BRASS COMPANY, BRIDGEPORT 2, CONN. • ESTABLISHED 1865

Mills at Bridgeport, Connecticut, and Indianapolis, Indiana • In Canada: Noranda Copper and Brass Limited, Montreal

Advertisement

tested have shown an improvement in economy of as much as 33 per cent. First requirement naturally is commercial availability of the premium fuel, and oil companies report it will not be too difficult to refine such a gasoline and arrange for its distribution at a premium of only a few cents a gallon. Once this appears assured, the high-compression ratio engine can be translated to production. The change will not occur all at once, but rather will develop by degrees, starting with a basic design which can gradually be stepped up in compression ratio as gasoline octane ratings are boosted.

Require New Manufacturing Facilities—The Kettering engine will require almost complete new facilities for manufacture, from foundry to final inspection. The V-type design, either an eight or a six, has peculiar advantages because it can be built with a more rigid construction, heavier block, shorter crankshaft, etc., to withstand the vastly higher bearing loads involved. Horsepower for horsepower the high-compression design can match present designs in terms of weight, although the higher horsepower likely to be characteristic of the new power plants probably will mean somewhat more weight. Blocks, pistons, connecting rods and crankshafts will be heavier and stronger. Better cooling, both by water and oil, will need to be provided.

Automatic Transmissions—Described at the Society of Automotive Engineers annual meeting a year ago as the hottest thing on the automobile horizon, the automatic transmission has cooled off a little in the ensuing 12 months. Difficulties in working out a foolproof and easily serviced design at anything resembling reasonable cost have been the principal stumbling blocks. Ford, for example, has tested at least three different arrangements over the past two years and even now has not completely frozen a design for production. Hence there will be no automatic transmission offered by Ford this spring. Likewise, Packard was touted early last year as having a new infinitely-variable transmission ready for production on new models, but somewhere along the line it faltered and remains on the agenda for some future model.

About the only new development in the transmission field is a torque-converter system which Buick will build for only one of its three series for 1948. Technical details have not been disclosed, except that the device provides shiftless, clutchless driving and is an adaptation of the transmission installed on tank destroyers which Buick built during the war. The unit functions on an entirely different principle from the automatic transmission which Olds and Cadillac have had available for several years and which this year will be offered on Pontiac. General adoption of any type of automatic transmission by the large-volume producers like Ford, Chevrolet, Plymouth and Dodge—and they will all have it sooner or later—is contingent upon the lowering of production costs and, of course, the decision to invest the many millions required for machine tools, heat treating furnaces, grinders, conveyors and related equipment not available in present transmission-building departments.

Unitized Frame and Body—A question now being kicked around by engineers in Detroit, is whether the so-called unitized frame and body construction, pioneered by Nash and Lincoln and so ingeniously adapted to the new Hudson, will eventually be accepted by all the industry. Strong opinions prevail on both sides of the fence. On the one side, the construction permits lowering the floor of the body to provide a smoother ride and more room inside bodies; on the other the change costs millions of dollars because it radically changes the whole concept of assembly of a car. Also, to a degree it may reduce the flexibility of body types which can be mounted on a single frame and chassis of conventional type. Further, it may complicate body repair work in the field.

Weight Reduction Sought—Overall, designers are still working toward weight reduction, although not too much progress has been made as yet. The first examples of real weight-lifting will be the new Ford models, slated for spring introduction, and the 1949 Chevrolet, to be ready in late summer or early fall. Expectations point to a saving of 10 per cent or better in both of these models. Weight reduction is possible only by a thorough combing of every single component of the vehicle to determine whether a change in material or a change in fabrication method can yield the desired lightness. A case in point is the Ford rear axle housing, which has been redesigned from a three-piece bolted construction to a single piece of steel tubing, upset and flanged at the ends, with the banjo section formed by slitting and expanding at the center. A light-gage pressed steel cover plate is arc welded over the rear side of the banjo.

Year of Labor Peace—In the main, automotive labor has emerged from a year of relative peace and quiet. True, there have been numerous minor insurrections, usually originating among a small group of men in a single department, which have resulted in abbreviated tieups, but no major disturbances have been recorded despite the threats and screams which union publicists poured out prior to passage of the Taft-Hartley Act.

In the ranks of the UAW-CIO, 1947 marked a distinct turning point, bringing as it did a complete overhauling and housecleaning late in the year of the executive and administrative ranks of the international union.

Leftists Routed—At the UAW-CIO convention in November, President Walter P. Reuther completely routed the so-called left-wing element and proceeded to eliminate all of their members from key posts in the union. Industry officials regarded the development as a healthy one, since they can now know whom they are dealing with in negotiations.

It appears certain the UAW will seek to reopen contracts this spring to consider economic issues, or in other words wage increases.

Human Error ELIMINATED FROM INSPECTION AND COST MATERIALLY REDUCED!

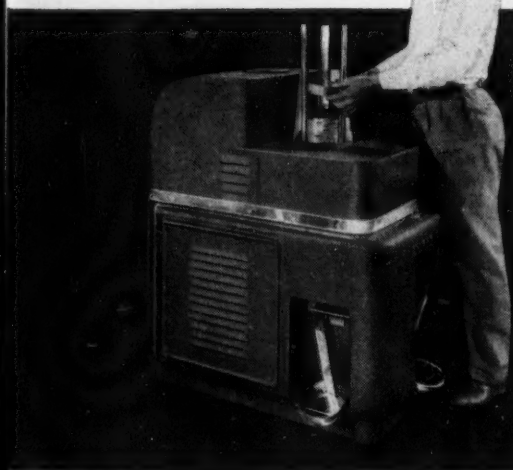
Manual inspection of piston rings is not only tedious and costly but its effectiveness depends to a great extent on the skill of the inspector. However, unless the inspection is accurate and every ring falls within tolerance limits, either the assembly of the motor or its performance is jeopardized.

Sheffield has eliminated these obstacles by developing equipment for both users and manufacturers according to their individual needs.

Typical is the automatic gaging machine shown in Figure 1 now being used in a large automotive plant which inspects and classifies 2400 piston rings per hour on the basis of gap width (to a tolerance of .007") and ring thickness (to a tolerance of .0005"). Classifications are:

1 *rejects for oversize gap*
2 *rejects for undersize gap*
3 *rejects for oversize thickness*
4 *rejects for undersize thickness*
5 *acceptable gap and thickness*

All the operator has to do is to feed the machine and remove the inspected rings from each classification chute.



The automatic unit in Figure 2, which serves an aircraft engine manufacturer, automatically inspects both gap and periphery of piston rings and segregates them accordingly.

The manually loaded electronic Piston Ring Inspector (Figure 3) also checks both periphery and gap at a speed of less than 5 seconds per ring.

If you have mass inspection operations where dimensional tolerances are critical, *chek with Sheffield* on automatic equipment to reduce costs and increase the effectiveness of inspection.

the **Sheffield** corporation

Dayton 1, Ohio **U. S. A.**

Sheffield MASTER CRAFTSMEN

{ *Standard Gages Shipped in 24 Hours* }

Men of Industry

JERRY M. GRUITCH

E. D. LONGENECKER

RAY PERIN

American Car & Foundry Co., New York, announces that **Jerry M. Gruitch** has been appointed director of research and development. He was associated with Ford Motor Co., Dearborn, Mich., from 1921 to 1929, and spent the next four years in engineering studies at University of Michigan. He joined the **Airtemp** Division of Chrysler Corp., Detroit, as experimental engineer, progressing to chief engineer of research and development of heating and refrigeration. In 1941 Mr. Gruitch joined the U. S. Armed Forces as Commanding Officer of the 712th Ordnance Co., and in 1945 was promoted to Colonel on Gen. Doolittle's staff at Okinawa, with supervision over all ordnance items used on the B-29 aircraft. Following his separation from the Air Forces Mr. Gruitch became assistant chief engineer at Dodge Division, Chrysler Corp., and later was vice president in charge of engineering, and a director, O. A. Sutton Corp., Wichita, Kans.

—o—

Stanley L. Willis has been named president and general manager, Standard Tube Co., Detroit, succeeding **T. F. Thornton,** who has retired. Mr. Willis, a graduate of Yale University, was formerly vice president and general manager of Standard Tube, a position he has held since joining the organization in 1943. Mr. Thornton, who joined the company in 1938, has long been associated with the automotive and tubing industry. The firm recently moved into its new plant at 24400 Plymouth Rd., Detroit.

—o—

Chain Belt Co., Milwaukee, has announced the election of three vice presidents: **O. W. Carpenter** has been appointed vice president in charge of finance and accounts; **B. F. Devine,** vice president and manager of the Construction Machinery Division; and **L. B. McNight,** vice president responsible for operation of the two heavy machinery divisions of the company.

—o—

E. D. Longenecker has been promoted to manager of parts and service department, Packard Motor Car Co., Detroit. He has been assistant manager in that department since shortly after he joined the company in 1944.

—o—

Frederick P. Hauck has been elected vice president and director of Michigan Abrasive Co., Detroit. He joined the company as a technical consultant, and later became factory manager in charge of production and research.

—o—

Earl W. Dilg has been appointed district manager, Patterson Foundry & Machine Co., East Liverpool, O. He will have headquarters at the Cincinnati office of the company. Mr. Dilg formerly was chief engineer and sales manager, International Engineering Inc., Dayton, O. He served in the United States Air Corps as engineer in the technical engineering service, and prior to that had been general manager of the Gem City Engineering Co., Dayton.

—o—

Vice Adm. George F. Hussey Jr., USN (ret.), wartime chief of the Bureau of Ordnance, Navy Department, has joined the staff of the American Standards Association, and on Jan. 1 assumed the duties as administrative head of that organization. In this capacity Adm. Hussey will continue to serve the nation by directing the co-operative efforts of industry, consumers and government in the problem of standardization. **Cyril Ainsworth,** for a number of years in charge of the technical activities of the American Standards Association, will serve with Vice Adm. Hussey as director of operations of the association's staff. In accepting the appointment, Adm. Hussey takes over the increased administrative responsibility from **Dr. P. G. Agnew,** who will continue as consultant.

—o—

Ray Perin, Ira G. Perin Co., has been elected president of the Materials Handling Association of Northern California. For 35 years Mr. Perin had been West Coast representative for Elwell-Parker Electric Co.'s trucks. He served with the Goodyear Tire & Rubber Co.'s British plant during the war, and upon return joined Ira G. Perin Co., Los Angeles.

—o—

C. K. Ross has been appointed to direct internal auditing work in subsidiary plants and companies of United States Steel Corp., New York, which are located between Duluth and New Orleans. He will direct this new set-up from headquarters at the company's Chicago general office.

—o—

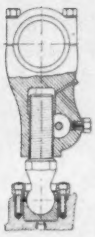
Kenneth C. Plasterer, formerly assistant manager, Buick-Olds-Pontiac plant at Kansas City, Mo., and associated with divisions of General Motors Corp. for over 20 years, has been appointed head of a new quality control department at the Lincoln-Mercury Division of Ford Motor Co., Dearborn, Mich.

—o—

Robert O. Boden, now serving as

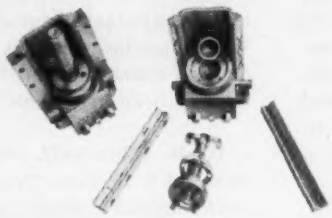
Presses outsell all other makes

③ CONNECTIONS



Another feature is solid, plug-clamp connection strap, which gives full 360° bearing against slide adjusting screw. This arrangement also permits using V-thread on screw, making replacement easy.

④ SLIDE ASSEMBLY

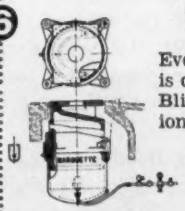


Slides are accurately gibbed to insure precise registry of die and punch. Ball seat is renewable, as are split bronze ball-cap bushings and laminated shim against which ball-cap is brought down by four bolts to give correct clearance for proper lubrication and fit. All parts are machined to close tolerances for interchangeability. For a fraction of the cost of a new slide, you can recondition the ball seat bearing.

⑤ BEARINGS, WAYS AND GIBS

Main shaft bearings and connection bearings are bronze bushed. Roller Bearings are standard for drive shaft bearings on large geared presses. All wearing surfaces are especially finished to insure long life.

⑥ CUSHIONS

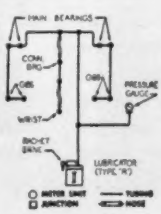


Every Bliss Inclinable Press is designed to accommodate Bliss Marquette die cushions which extend the press application to drawing operations on medium gauge metal.

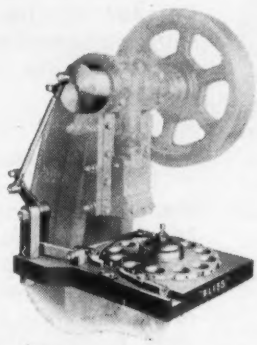
Many Bliss cushions are supplied for presses that have been in use for years. Placing the responsibility for efficient press and cushion operation with Bliss assures you of the utmost in satisfactory performance.

⑦ LUBRICATION

Bliss Inclinables have floor-line lubrication systems with oil or grease fittings at main points of moving contact. All standard Bliss Inclinable frames are machined to take Bijur one-shot pressure system.



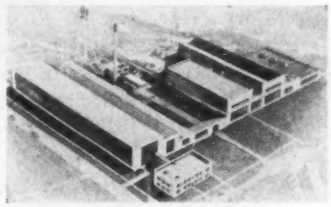
⑧ FEEDS



Bliss Inclinable Presses are designed to take any type of Bliss automatic or semi-automatic feed. Addition of a few extra parts to the regular constant tension brake will convert it to an automatic releasing brake for continuous operation with roll, dial or magazine feeds. Every Bliss feed is engineered to specific requirements yet a large variety of standard designs is available. A Bliss feed on a Bliss press means the finest equipment that money can buy, plus a *single responsibility* for efficient performance of entire unit.

⑨ SERVICE

All replacement parts and service orders carry *top priority* at Bliss to reduce your press "down time." Supplying service parts for presses more than 50 years old is routine at Bliss. Accurate-fitting parts are supplied from stock by virtue of precision manufacturing methods which guarantee interchangeability. A large sales and service organization is available. Incidentally, one effective way of preventing costly shutdowns is to call for a Bliss service inspection of your Bliss presses. A highly competent maintenance man will call on you and the chances are that he will spot trouble before it happens.



The Bliss plant at Hastings, Michigan is specially equipped for quantity production of parts for Inclinable Presses.

These are the reasons—plus the fact that *they are priced right*—that are most often reported by the trade for its preference of Bliss presses.

If your pressed-metal production calls for inclinable presses, you're sure to find the specific answer among Bliss' 20 standard sizes. And a Bliss sales engineer will be on hand to give you unbiased counsel. Remember too, "BLISS" on your press is more than a name...it's a guarantee!

Write today for catalog 2-B illustrating the new Bliss Inclinable Presses and Service Sheet A-105 giving operating and maintenance instructions for the complete line.

E. W. BLISS CO., 448 AMSTERDAM, DETROIT 2, MICH.

Mechanical and Hydraulic Presses, Rolling Mills, Can and Container Machinery

WORKS AT: Toledo, Cleveland, Salem, Ohio; Hastings, Mich.; Englewood, N. J.; Derby, England; St. Ouen sur Seine, France. SALES OFFICES AT: Detroit, Hastings, Mich.; New York, Rochester, N. Y.; Cleveland, Dayton, Toledo, Ohio; Philadelphia, Pittsburgh, Pa.; Chicago, Ill.; Boston, Mass.; New Haven, Conn.; Windsor, Ont.

STAY AHEAD WITH *Bliss*

BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY

ager, switchgear sales in the Philadelphia office; and lately, assistant to the president.

—o—

Norman Edwards has been appointed organization manager for Cadillac Division, General Motors Corp., Detroit.

—o—

William Clausen has been elected vice president in charge of manufacturing, Farnsworth Television & Radio Corp., Fort Wayne, Ind. He had been made manager of operations for the company last October, and previously was vice president and general manager of Victor Products Corp., Hagerstown, Md.

—o—

E. M. Detwiler, assistant works manager of the Buffalo works of Worthington Pump & Machinery Corp., Harrison, N. J., has been promoted to works manager of the Worthington works in Holyoke, Mass. He has been associated with the company since 1929.

—o—

A. E. Keough, New York, has been elected president of the Motor & Equipment Manufacturers Association. Other officers elected are **Bert G. Cochrane,** Bridgeport, Conn., vice president; **W. M. Albaugh,** Cleveland, secretary; and **Clyde P. Brewster,** Lancaster, Pa., treasurer.

—o—

Dr. Wallace R. Brode has been appointed associate director of the National Bureau of Standards to succeed **Dr. Hugh L. Dryden,** recently appointed director of aeronautical research, National Advisory Committee for Aeronautics.

—o—

Thurlo F. Johnson, central regional sales manager, has been appointed to the newly-created position of director of national service for the Norge Division, Detroit, of Borg-Warner Corp.

—o—

A. J. F. MacQueen has been appointed superintendent, electrical department, Algoma Steel Corp. Ltd., Sault Ste. Marie, Ont. He joined the company in 1943 as superintendent of electrical and mechanical maintenance. He has served in the past with Sharon Steel Corp., Sharon, Pa., and Rotary Electric Steel Co., Detroit. **William O. Bishop** was recently appointed technical assistant of the blast furnaces of Algoma Steel Corp. Ltd.

—o—

John J. Harding, president, Massillon Aluminum Co., Massillon, O., and a member of the executive committee of Ekco Products Co., Chicago, which owns Massillon Aluminum Co., will resign Feb. 1. He became general manager of Massillon Aluminum Co. in 1928, and later purchased the controlling interest in the company. In 1945, he and his associates sold the aluminum company to Ekco Products Co., and Mr. Harding continued to serve as president, and was later appointed to the executive committee of Ekco.

—o—

Gar Wood Industries Inc., Wayne, Mich., announces **Walter C. Robertson,** associated with the company for 21 years, has been named vice president in charge of the company's exports. **John C. Moons** has been elected treasurer and a director, and **Edward F. Fisher,** director of General Motors Corp., Detroit, has also been elected a director. Mr. Fisher, formerly general manager of the Fisher Body Division of General Motors, intends to devote a substantial part of his time to Gar Wood Industries.

—o—

Battelle Memorial Institute, Columbus, O., has appointed **Morgan Sibbett** to its technical staff, to work with **Dr. Richard J. Lund** in making economic appraisals of new engineering developments for industrial and governmental sponsors.

—o—

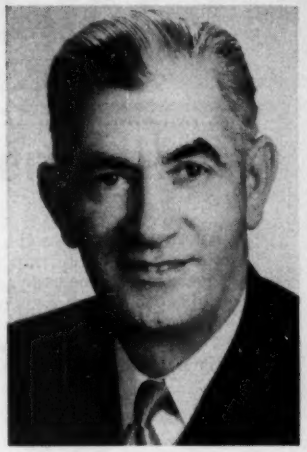
William G. Theisinger, manager, technical plate sales, Lukens Steel Co., Coatesville, Pa., addressed the Columbus, O., section of American Welding Society on "The Fabrication of Clad Steels."

—o—

Marion Power Shovel Co., Marion, O., announces the appointment of **Wm. F. Lanius** as sales representative at Portland, Oreg., succeeding **Joseph Reed,** who has represented the company in that territory for the past seven years.

—o—

Dean H. Crandell, vice president in charge of research, National Gypsum Co., Buffalo, has been elected vice president in charge of sales and advertising, succeeding **Ralph F. Burley,** who is on leave of absence. **Lewis E. Sanderson,** superintendent of construction, has been named vice president in charge of operations, succeeding **Gordon H. Tarbell,** retired. **Frank L. March** succeeds Mr. Crandell. **Charles E. Masters,** controller, has been promoted to the new position of vice president in charge of accounts. **William T. Davidson** has been placed in charge of a newly-created administrative planning department, and **Fred A. Manske** has been appointed



W. B. WHENTHOFF

general production manager in charge of all manufacturing. **E. B. Hollingsworth** has been named assistant production manager, and **S. David Skinner** has been made chief engineer.

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W. B. Whenthoff, who became associated with Tube Turns Inc., Louisville, in 1937 when he opened the firm's Tulsa, Okla., office, returns to the Houston, Tex., office which he established in 1941, and where again he will be in charge of marketing the products of Tube Turns Inc. in that area. Mr. Whenthoff's entire career has been devoted to the sale of industrial supplies and equipment in the West, Southwest and Mexico.

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Robert T. Keller has been appointed vice president, Chrysler Corp., Detroit. He will assume duties of general manager of the Marine & Industrial Engine Divisions. **Joseph A. O'Malley,** who has been head of these divisions for several years, will continue as vice president, in addition to his duties as assistant general sales manager of the Chrysler automobile division. Mr. Keller was works manager of the company's tank arsenal in Detroit during the war.

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Walter M. Boyden has been appointed sales manager, Hy-Pro Tool Co., New Bedford, Mass., manufacturer of high speed steel commercial and precision ground taps.

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J. Heath Braselmann has joined the sales force of Cans Inc., Chicago. For the past 25 years he has been with the Liberty Can Co., Lancaster, Pa., serving as representative in charge of the company's New York office.

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Effective Jan. 1, A. M. Castle & Co., Chicago, announces the following changes in its organization: **Leroy W. Westerbeck** has been appointed manager of the Los Angeles warehouse,

The New Improved "B-Line" MOTORS & GRINDERS

"TRULY LIFE-TIME MOTORS" B-LINE

B-LINE
Standard motors from 1/6 to 30 H.P., also Condenser and Gear Head Motors, and motors for special applications.

B-LINE "TOOLMASTER" GRINDERS—A complete line of Bench and Pedestal Type from 1/4 to 5 H.P. ratings—Every B-Line product is GUARANTEED and backed by Coast-to-Coast Service. Ask for Bulletin No. 5000 on Motors & Gear Motors, or Bulletin No. 7000 on Electric Grinders.

IMMEDIATE SHIPMENT on standard stock sizes out of our Dayton Plant and District Warehouses.

THE BROWN-BROCKMEYER COMPANY

PLANTS AT DAYTON, WILMINGTON, WASHINGTON AND XENIA, OHIO

GENERAL OFFICES, DAYTON 1, OHIO

District Offices in Principal Cities

JOSEPH A. WHITE

Appointed works manager, Chicago plant, Ingersoll Steel Division, Borg-Warner Corp., Chicago. Noted in STEEL, Dec. 8 issue, p. 84

JOHN L. BEARD

Promoted to manager, Small Products Division, American Hoist & Derrick Co., St. Paul. Noted in STEEL, Dec. 15 issue, p. 82

CHARLES E. CARLL

Who has been appointed public relations director of the Ford Motor Co., Dearborn, Mich. Noted in STEEL, Dec. 8 issue, p. 86

succeeding **John L. Robertson,** resigned. **Harry Christensen** has been appointed manager of sales at the Los Angeles warehouse, succeeding Mr. Westerbeck, who has served in that capacity for the past 23 years. Mr. Christensen is succeeded as assistant general manager-sales at Chicago by **Robert J. Heggie,** who has been with the company for 13 years, and has a broad sales experience in the Chicago territory. **Harry Falkenberg** succeeds Mr. Heggie as secretary of the company.

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Norman P. Robie has joined the research staff of the Electro Refractories & Alloys Corp., Buffalo, as engineer-in-charge of organic and abrasive research.

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John Morel has been elected a director of Southern States Iron Roofing Co., Savannah, Ga. Also elected to the board of directors are **Thomas Oxnard, Livingston B. Keplinger, James P. Houlihan Jr.**

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Louis J. Baudis has been appointed chief engineer of the Bullard Co. machine tool plant at Bridgeport, Conn. **Robert W. Waring** has been appointed assistant chief engineer, and **Joseph C. Olson,** head of the service and demonstration department. Mr. Baudis has been associated with the plant since 1935, and has served as development engineer and assistant to vice president in charge of manufacturing. Mr. Waring was formerly chief engineer of a division of Bridgeport Brass Co., and process engineer, Sperry Gyroscope Co., Long Island, N. Y.

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A. E. Taylor has resigned as representative of Edgar Allen & Co. Ltd., Sheffield, England, with which he has been connected for 44 years. He is succeeded by **Gilbert Francis,** commercial manager of the Edgar Allen steel foundry.

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Mark R. Dull Jr., managing director of Willys-Overland de Mexico, the Mexican operation of Willys-Overland Motors Co. Inc., Toledo, O., has been named assistant general manager of Willys-Overland Export Corp., also of Toledo.

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H. O. Holland, formerly vice president, American Brake Shoe Co., New York, has been appointed director of sales for Automatic Steel Products Inc., Canton, O., formerly the Automatic Products Co.

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George P. Steinmetz, Madison, Wis., has been elected president of the Southwest Chapter of the Wisconsin Society of Professional Engineers. **H. C. Lord** has been elected vice president, **Phil H. Thern,** secretary-treasurer, and **W. S. Cottingham, John T. Drow,** and **John S. Piltz,** directors. All are from Madison. The Southeast Chapter of the society has elected **Walter E. Dick,** secretary, and **Arthur P. Kuranz,** director.

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Games Slayter, vice president in charge of research and development, Owens-Corning Fiberglas Corp., Toledo, O., has been chosen to receive the 1948 Industrial Research Institute medal, presented for outstanding contribution to the field of industrial research.

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Dravo Corp., Pittsburgh, announces the appointment of **William H. Collins** as director of advertising.

—o—

Horace H. Greenfield has been appointed general sales manager, **Ford** Motor Co. of Canada, at Windsor, Ont., succeeding **Stewart C. McLaren,** resigned. Mr. Greenfield has been with the company since 1929, and assistant general sales manager for the past few months.

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Easy Washing Machine Co., Syracuse, N. Y., has named **Charles F. McCandless** director of the new marketing and product research department.

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A. O. Samuels has resigned as director and vice president, Casco Products Corp., Bridgeport, Conn. **J. H. Cone,** president, assumes the general managership, assisted by **L. E. Fenn. J. J. Reidy** has been named sales manager of the Appliance Division.

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R. E. Larson has been elected chairman, Sanitary Brass Institute. **J. S. Hinkley** has been elected vice president, and **Paul Kreuzer,** treasurer.

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Appointment of four Alabama industrialists to executive positions has been announced by the National Association of Manufacturers. **Warren T. Whitney,** vice president, James B. Clow & Sons, and **Hugh Comer,** president, Avondale Mills, have been made vice presidents. **Herbert C. Stockham,** president, Stockham Pipe Fittings Co., and **William M. Neal,** vice president, Sloss-Sheffield Steel & Iron Co., are directors. All are located at Birmingham.

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J. Shires Jones has succeeded **Robert B. Smith** as district sales manager at Birmingham for Truscon Steel Co., Youngstown. Mr. Jones comes from Truscon's Greensboro, N. C., office. Mr. Smith has become affiliated with Contractors' Material Co., Jackson, Miss.

1948

Annual Forum on

Technical Progress in Metalworking

More rolling capacity for "super alloys" imminent . . . Stamping industry to feel steel shortage 'til late this year . . . Output of die castings eclipses wartime production . . . "Mass-production" treating boosted by automatic conveying . . . Protective coating consumption at highest rate . . . Machine tool industry not designing itself out of business . . . Cold charging still bottleneck in most open-hearths

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Metallurgy

Bearing properties improved with electrodeposited alloys. . . Materials substitutions to continue. . . Substructural imperfections identified with fractography. . . Rolling capacity for "superalloys" imminent. . . Basic metallurgical knowledge to widen

Graphitization Resistance Aided By Alloys in C-Mo Steels

J. W. Bolton, director, metallurgical research and testing, Lunkenheimer Co., Cincinnati: "Instability of carbon molybdenum steels, wrought and cast, at temperatures in the neighborhood of 900° F in respect to graphitization attracted much attention during the last few years. Weld affected areas were most prone to such graphitization. A practical approach to increasing graphitization resistance in case of cast steels is to add alloys inhibiting this reaction.

"Chromium is among elements which it was hoped would provide a simple answer to this problem. Co-operative researches showed that chromium within the range 0.4 to 0.7 is not a fully effective preventative. Co-operative work is being pursued on steels of chromium range 1.0 and above. Complete results of this program are not available.

"It was found that the higher chromium ranges are beneficial toward graphitization resistance. It may be, as indicated by some tests in the writer's laboratories, that the higher chromium ranges intensify some welding problems. It was first demonstrated here, and by prior field installations, that a cast nickel chromium molybdenum steel, specifically the ASTM A-217 grade WC-4 is quite graphitization-resistant. We are informed that other researches confirm these findings.

"Meanwhile some newer central stations are going to temperatures of 1000° F or slightly above. Not only must steels for this usage be graphitization resistant, but they also must be of better load carrying capacity ("creep strength") than grades formerly available. The first station installed and operating at 1000° F chose the ASTM A-217 grade WC-5, and two stations now under construction (operating temperatures to be about 1050° F) also will employ that grade.

Substructural Imperfections Identified with Fractography

Carl A. Zapffe, metallurgist, Baltimore: "Shortly before the war, Battelle Memorial institute discovered a microscope technique allowing the study of fracture facets at high magnification. Astonishing structures found on those facets and the delicacy of their detail prompted the Rustless Iron and Steel Division of Armco to prosecute development of the technique in their research laboratory. It was then discovered that "fractographs" contain information not only complementary to that observed by conventional etch-polish techniques, but much that is otherwise unobservable.

"First, the crystal fails along a plane which automatically has registered upon it all structural elements of the crystal: Twins, slip lines, Neumann bands, secondary cleavages, phase changes, dendrites, lineages, and all other imperfection types. By these, one can identify the metal closely with regard to composition, to crystal structure, and to history; and with great detail in regard to substructural imperfection. Papers describing applications of the technique, now known as 'fractography,' have appeared in English, French, and American Journals; and numerous others are in process of publication. At least one commercial application has already been announced, wherein the selection of forgeable molybdenum ingots made by Climax Molybdenum Corp.'s electric-arc process is based upon a simple fractographic examination which immediately separates forgeable from non-forgeable material.

"Under contract with the Office of Naval Research, the writer's consulting laboratory is now in its second year of developing fractography, particularly in its fundamental aspects. Bausch and Lomb Optical Co. will market a specially designed 'fractographic stage' with which the technique can be readily applied in any metallographic laboratory."

Electrodeposited Alloys Improve Bearing Material Properties

L. A. Barera, laboratory superintendent, research division, Federal-Mogul Corp., Ann Arbor, Mich.: "Present day demands of bearing materials for high speed engines of greater unit loads are being met to some extent by the steel back copper-lead bearing. Although fatigue resistance and load carrying properties of certain tin base babbitt alloys of steel backed bearings have been increased by decreased lining thicknesses, the increased properties are not sufficiently high enough to replace certain present day copper-lead applications.

"In spite of the better fatigue resistance of the copper-lead alloy, it does not possess certain other bearing metal characteristics such as embeddability, conformibility, seizure resistance, corrosion resistance, anti-scoring properties, etc., as does the tin base alloy. In addition, copper-lead bearings require a hard shaft for best performance.

"It can readily be seen that the load carrying properties of copper-lead in conjunction with the bearing properties of tin base alloys (as mentioned above) is most desirable. This has been approached somewhat by

an electro-deposited lead-tin overlay (0.00075 to 0.001-inch thickness) upon the copper-lead steel backed bearing."

Beryllium Copper Useful In Heavy Gage Applications

H. G. Williams, chief metallurgist, Instrument Specialties Co. Inc., Little Falls, N. J.: "During the past year there were two developments of note in the beryllium copper field. First was the release of several new alloys using a lower beryllium content which offered the trade greater working ease in a lower cost alloy. The objective was to widen the base for using beryllium copper in heavier gage applications where material cost had been a deterrent factor. Any sacrifice in properties is so slight that it should result in greater use of this alloy.

"The second development was the wide spread application of 'spring in string', a process wherein separate parts are only partially severed from the strip and furnished in maximum lengths of 15 or 16 inches. Heat-treatment of small parts is made possible without handling individual units, thus considerably reducing inspection time and process handling.

"Rather than use the precision tolerances obtainable for small scale instrumentation applications, the trend today is to apply them towards reduction of labor and assembly line costs.

"I believe it worthy of note that beryllium copper products are being produced at a lower cost than ever before and that while other costs are rising, the alloy is running contrary to the trend. The reason, of course, is continued technological improvement in this relatively young industry."

Forecasts Powder Metallurgy Improvement in Coming Year

A. J. Langhammer, president, Amplex division of Chrysler Corp., Detroit: "Progress has been made in the quality and production of iron powder during 1947, and we look for further improvements in 1948. This is timely, particularly with reference to machine parts, that is, units other than bearings.

"Expense of tooling by the normal methods and operations has increased appreciably since the early forties; consequently, industry as a whole is turning more and more to machine parts made from metal powders, noticeably those of iron powder, or iron powder base. Most parts made by powder metallurgy are furnished as finished units ready for assembly; thus not only is a tooling program avoided, but existing machine tools are released for other work. The time element required for producing a finished part by powder metallurgy is one-fourth to one-tenth normally required.

Isothermal Quenching Broadens Scope of Heat Treatment

Orlo E. Brown, chief metallurgist, Western Gear Works, Lynwood, Calif.: "A new era has been opened by the application of war-learned skills and accuracy to peace-time production. Much of the present development is concerned with the economical application of these skills. Fortunately competition is an extremely able instructor.

"Among the improvements, we are finding heat-treated alloy castings used for heavy duty work to cut both weight and cost from former carbon steel construction. Welding of 0.30 and 0.40 per cent carbon steels has become an accepted production procedure, with the entire welded assembly being heat-treated.

"Probably the most far-reaching processing changes come as a result of the growth in knowledge of heat-treating. By isothermal quenching, and other applications of S-curve knowledge the entire scope of heat-treating has been broadened.

"It is to be expected that in the foreseeable future there will be super alloys that will stand operating temperatures of over 2000° F., in addition to 100,000 psi aluminum and 70,000 psi magnesium. But for the manufacturer today, the important advance is what he can now get that was unobtainable before the war—mass produced quality precision parts for improvement of his bread-and-butter production items."

New Rolling Capacity for "Super-Alloys" Imminent

C. G. Chisholm, Haynes Stellite Co., New York: "Standard specifications were set up by the Society of Automotive Engineers for various heat- and corrosion-resistant alloys used in aircraft jet engines for the first time in 1947. Among them were Hastelloy alloy C and Multimet alloy. Both of these alloys were used extensively, during the latter part of 1946 and early 1947, in the development of various aircraft parts for high-temperature service—such as combustion chamber liners, tail cones and stacks, and nozzle diaphragm assemblies. Favorable results obtained in this experimental work, as well as the standardization of production requirements for the alloys, has greatly increased the demand for both the materials. Considerable testing and development work is also being done on wrought cobalt-base, high-temperature alloys—particularly on production rolling problems.

"Because of the great demand for the super-alloys, in wrought form, Haynes Stellite Co. is building a rolling mill at Kokomo, Indiana, to produce both sheet and bars. This mill is expected to be in operation in the early part of 1948. Incorporating the most modern rolling facilities, it should further improve the quality as well as speed delivery of wrought products."

Use of Recent Developments Helps Meet Stiff Competition

J. A. Scully, president, Scully-Jones & Co., Chicago: "Our field of production tooling is highly competitive, demanding utilization of the latest developments in steels, machining, materials handling, production control and incentives in order to stay in business and operate at a profit. Some of the developments we have taken advantage of are: Sulphite treated steels (A-8641) are used extensively, because they have very favorable machining, physical and heat treating properties. They offer great economy in our steel inventory and in

our processing operations.

"C-1144 high tensile steel with brinell hardness of 230-290 has very good machining qualities and strength and permits us to furnish tools of improved quality at reasonable cost, where originally tools made of steel in the annealed, soft state were used. By using selective hardening by induction heating we are able to make tools which provide wear resistance, accuracy and toughness in the places needed.

"Installation of electric salt bath furnaces has resulted in less distortion, reduced grinding stock, elimination of scale, and improved overall economy.

"Our use of an induction unit permits selective heat treating of surfaces which require increased wear resistance and has resulted in large savings in machining and heat treating costs. We also use an induction unit for brazing on a production basis. It produces clean, reliable joints at low cost."

Materials Substitutions To Continue During 1948

J. T. Jarman, general superintendent, met. and chem. lab., Allis-Chalmers Mfg. Co., Milwaukee: "Substituting of materials in the last half of 1947 and all of 1948 has kept and will keep the materials department busy. Many old prejudices have broken down due to wartime substitution and knowledge of better control procedures; and therefore, generally, substitution should not be a serious handicap where adequate information is available and proper control procedures are functioning.

"In carbon and free machining steels, there are opportunities for including a wide range of steels for specific engineering applications, where no heat treatments or critical heat treatments are involved. In cases of substitution within carbon steels or substitution within alloy steels considerable judgment must be used where the hardenability is approximately equal but dimensional modifications on treating are a vital factor."

1947 Viewed as Theory Year Offering Future Potentialities

Dr. R. H. Harrington, research metallurgist, General Electric Co., Schenectady, N. Y.: "According to published reports, it is clearly evident that the wartime backlog was cleared up in 1945 and 1946. The year 1947 witnessed a reversion to highly detailed studies of the effects of standardized treatments and processes on the more industrially important alloys. There was a paucity of new alloys and new processes.

"Some of the subjects of continued interest were: Induction-hardening of specific steels; dimensional stability of steels as affected by subatmospheric transformations and austenite and martensite decompositions at room temperature; tempering effects versus the recently developed 'mechanical equation of state'; stress and strain theories relative to mechanical equation of state'; stress tization of steel at elevated temperatures; the fatigue strength of binary ferrites; further grain growth studies of alpha brass and aluminum and its alloys; high temperature alloys; preferred orientations in drawn and annealed alpha brass tubes; quenching studies of aluminum alloys such as 75S; factors in heat-treating magnesium alloys; comparison of properties of commercial coppers; and oxide films on tungsten and molybdenum and passivity of chrome-irons.

"There is a 'prediction-feeling' that 1948 will be, metallurgically, more prolific than was 1947. The year 1947 might be called a 'theory year': a year of future potentialities."

Notch Sensitivity of Plate Steel Actively Studied

Samuel Epstein, engineer, research department, Bethlehem Steel Co., Bethlehem, Pa.: "Studies of the susceptibility of engineering structures to brittle fracture are being actively continued. Soft steel such as ship plate will not break with a brittle fracture unless it is severely notched. However, since notches may occur in engineering structures as a result of design, workmanship, or service conditions, it becomes necessary to consider the notch sensitivity of the steel.

"Plate steels vary in notch sensitivity, some steels being more notch sensitive and others less so. For given design, workmanship, and service it may in general be supposed that the chances of brittle fracture occurring will diminish if less notch-sensitive steel is used.

"Most common way to determine notch sensitivity of plate steel is by notched-bar impact tests such as the Charpy test. The concept of expressing the notch sensitivity by the transition temperature, that is by the temperature at which the fracture changes from ductile to brittle as the temperature is lowered, has represented a very great advance in notch-bar testing. Such tests show that thicker plates are much more notch sensitive than thinner plates. Lower-carbon, higher-manganese plates are less notch sensitive than ordinary ship plate. Aluminum-killed plate is still less notch sensitive than either of the above steels. In the last type of steel in particular, normalizing gives a further marked decrease in notch sensitivity.

"One of the main reasons for going to the large full-size notched-plate tests was to study the effect of stiffness of structure, such as might be present in a large ship."

Less Attention to Composition More to Hardenability of Steels

Howard E. Boyer, chief metallurgist, American Bosch Corp., Springfield, Mass.: "A great deal of credit should be given to the progress which has been made in the evaluation of steels by hardenability rather than composition alone. Heat treaters have long been faced with the problom of obtaining uniform results in the processing of steels from mixed heats. Even though all specified elements were within prescribed limits it is often found that those elements controlling the hardenability will, collectively, be at one end or the other of the specified range. This affects hardenability to a marked degree and subsequently the uniformity of the heat treated parts. It appears that within a few years it will become universal practice to purchase stee

by hardenability with less attention focused on composition.

"The field of strains and stresses is very large and one about which too little is yet known. Engineers in various branches of the metal working industry are rapidly learning to apply information obtained by stress analyses of parts in actual operation. Considerable progress has also been made in obtaining higher physical properties, particularly in the case of heat treated steel parts, from intelligent studies of residual stresses. There is no doubt that continued research in this important field will open up many new possibilities for the designer, as well as materials engineers and other people involved in the fabrication of metal."

Metallurgist Can Offer Aid to the Design Engineer

Arnold P. Seasholtz, consulting metallurgist, Seasholtz Metallurgical Service, Lancaster, Pa.: "Today, design engineers are demanding greater performance from structural materials and tool steels. They aim to increase the life and load while simultaneously decreasing the weight of material. To keep pace with these greater demands the metallurgist has developed new procedures concerning the selection of materials and more efficient methods of treatment. These improved methods, not always familiar to the design engineer, often offer better properties and more economy in processing. Some of these methods are austempering, martempering, copper and silver brazing, various forms of case hardening, type of atmosphere, salt baths, induction heating and selective treatments.

"Unfortunately, the design engineer often has the authority to specify the physical properties needed, the grade and chemical analysis of the steel and its method of heat treatment. Many errors and early failures could be avoided if the engineer would consult the metallurgist concerning selection of material and its subsequent heat treatment.

"The modern metallurgist has effected many new developments in industry through years of study."

Higher Speeds Demand Better Bearing Qualities

Joseph J. Mayer, vice president, Lumen Bearing Co., Buffalo: "Higher speeds and increased productive capacity have brought about a demand for higher bearing qualities and increased physical strength in the castings which are later to become component parts. This requirement is within the castings themselves rather than as has been the custom in the past, in test bars.

"To meet this requirement, various means are employed to control the cooling rate, which in general means rapid cooling to provide sound, dense, fine grain structure throughout the section of a casting, which by the ordinary means of treatment where the wall sections are heavier by nature, are coarse grained and lower in physical strength.

"Need for such improved materials exists strongly in the machine tool bearings, various types of nuts and primarily in worm gears. In addition, to bring about the possibility of the cooling rate control results, closer adherence to analysis and selection of raw materials is required, together with very rigid melting practice and closer limits of pouring temperature ranges."

Sees Increase in Basic Metallurgical Knowledge

A. S. Jameson, assistant manager of metallurgy, International Harvester Co., Chicago: "There has been a marked increase in the basic knowledge of metallurgy in the last few years; some part of this is due to atomic power research. The discovery that an element can exist in several forms chemically identical but differing in weight and mass is a significant one.

"Aside from the wide field offered to investigators by the discovery of isotopes, there are certain trends in the use of recently developed equipment such as: (1) The electron microscope with its relatively enormous resolving and magnifying power as compared to the light microscope. Its application is being made to the study of metal structures hitherto irresolvable. (2) Fatigue testing machines capable of subjecting parts to alternating stresses comparable with those actually developed in the field service. (3) The use of SR-4 strain gages with recording oscilloscopes to locate and study stresses in structural members when they are in operation as an integral part of a machine, is finding extended use in design and research laboratories."

Rolled Isotopes for Shielding Sources of Nuclear Energy

Arthur E. Focke, chief metallurgist, Diamond Chain Co. Inc., Indianapolis: "In the field of metallurgy recent technical advances have made it possible to imagine as probabilities things that would have been considered fantastic only a few years ago. Men qualified to speak with authority are reporting that marked progress has been made toward obtaining ferrous alloys with tensile strengths in millions of pounds per square inch. Others state that it is possible, with proper processing, to produce low cost ferritic alloys, which will remain tough in the notched bend (impact) test to temperatures well below —100°F.

"A new alloy capable of providing useful strength and corrosion resistance at 2100° F has just been announced and serious efforts are being made to develop others suitable up to 2500° F. It is known that some of the isotopes of certain metals possess enormous abilities to resist the penetration of neutrons as compared with the common metals and people are talking seriously of producing these isotopes in quantities sufficient that they could be made into sheets or plates for shielding sources of nuclear energy. It is true that these probabilities do not help us to do our jobs in industry today but they point out a little of the mendous opportunities."

Casting

Foundry research concentrates on reducing costs. . . Higher freight rates force foundry sand reclamation. . . Steelmaking benefits through casting research. . . Labor cost and scarcity compel operational study

Predicts Better Finishes For Gray Iron Castings

W. L. Seelbach, president, Superior Foundry Inc., Cleveland: "The year 1948 will see much progress in the development of better finishes for gray iron castings. Much work has been done on sand research and foundries participating in this research, have developed sands used in mold conveying sand-handling equipment that produce a very fine smooth gray iron casting surface.

"The use of correct sand not only makes gray iron castings look better, but it reduces casting losses in the foundry and returns from customers."

Foundries Pay Attention to Basic Scientific Principles

H. A. Schwartz, manager of research, National Malleable and Steel Castings Co., Cleveland: "Perhaps the most encouraging sign of the times in the foundry business is the increased attention being paid to fundamental scientific principles. The principles now being actively studied seem to fall largely into the group which explain the gating and feeding of castings.

"The heat transfer session of the 1947 AFA convention, which dealt primarily with freezing rates and the like, drew audiences three or four times as large as expected, which seems to indicate a considerable interest among foundrymen in learning why things happen.

"The work of the Technical Research Committee of the Steel Founders' Society, although not available to the general reader in many cases, has also concerned itself very largely with questions of feeder design.

"It seems to me that unless and until the foundry industry places itself upon some firm engineering basis it will continue to be an art and never come under scientific control, nor will it attract to itself young men of engineering education, unless these men can be convinced that when they enter the foundry business they will, rather promptly, be expected to work with their heads rather than with their brawn."

Casting Porosity Eliminated By Inert-Gas Flushing

P. M. Hulme, metallurgical engineer, Air Reduction Sales Co., New York: "Several metal industries have long been bothered by dissolved-gas porosity in castings and ingots. Steel men refer to wild heats, or bleeding ingots; copper refiners run into unhealthy, rainy, or overpoled copper; aluminum foundries contend with pinhole porosity. In each case, the root of the trouble is hydrogen, dissolved in the molten metal and precipitated out as the metal freezes losing its capacity for retaining gas in solution.

"One of the most flexible, simple, and economical means of solving the problem is flushing. Flushing is nothing but bubbling an inert gas through molten metal — an artificial boil. While its effects have been known for some time, only the recent developments in hydrogen-free inert gases have made the process generally practicable.

"The action of the inert gas is entirely physical. Bubbles of the inert gas, rising through the molten metal, start out free of hydrogen, but because there is an appreciable pressure of dissolved gas in the melt, the hydrogen diffuses through the inert-gas-metal interface into the bubble of inert gas, and so each bubble carries a certain amount of hydrogen to the surface.

"Argon and nitrogen are the most important gases used in the flushing process — nitrogen, for economy, where nitriding is not a problem, and argon where nitrogen might react unfavorably as in certain steels. Since aluminum is the metal most susceptible to dissolved gas porosity, it has been the most widely developed field for the process, and is a steadily increasing application. Wherever used, in conjunction with good refining and casting practices, flushing gives melters positive control over dissolved-gas porosity, and is a thoroughly useful tool in producing sound castings. With present-day cost factors and quality standards placing exceptional emphasis on producing a sound casting or ingot, the trend in many plants is toward flushing every heat.

"Flushing is becoming to be regarded more as insurance than as a cure for the dissolved-gas porosity problem."

Cites Advantages of Continuous Casting Copper Base Alloys

E. W. Lovering, chief metallurgist, Seymour Mfg. Co., Seymour, Conn.: "Continuous casting of copper base alloys has come into considerable prominence and a new plant has been erected for supplying continuous cast metal. Advantages of continuous casting are the absence of gate scrap, the extremely fine, dense structure due to the rapid chilling, and the excellent surface of the material.

"Close tolerances possible with this type of casting have enabled screw machine operators to use rods directly in the screw machine, where previously the parts could only be made by sand casting and machining because the alloys could not be worked. In addition, the excellent soundness and microstructure of continuous cast metal has favored its use in wrought alloy forms where working operations previously gave high scrap because of unsound chill castings for the conventional cold rolling operations.

Several brass companies are making billets and bars only by continuous casting methods and some even anticipate that this method will supplant conventional casting methods completely in time.

"Cold rolling strip has been greatly aided by the new Sendzimir mill. The reductions on such a mill can be very great because of the small roll deflection; and the gage variation is very small.

"Annealing with the use of cracked ammonia atmospheres has become more common with copper base alloys in the past year. Anhydrous ammonia is cracked at high temperature with a nickel catalyst and yields a gas containing 75 per cent hydrogen and 25 per cent nitrogen with a dew point of minus 40° F. The obvious advantages of this atmosphere are its simple preparation, high purity, low dew point, and extremely reducing characteristics.

"Surface of copper base alloys annealed in such an atmosphere is bright in a true sense of the word in that it closely resembles a rolled surface. Strip annealers, which unwind the coiled strip and anneal it as such and then rewind in a coil outside the furnace have frequently used cracked ammonia as the atmosphere with very excellent results."

Suggested Remedies To Help Overcome Foundry Handicaps

A. W. Gregg, executive engineer, Whiting Corp., Harvey, Ill.: "The gray iron foundries of the United States have been seriously handicapped during 1947 by shortages of all kinds, but especially by the inadequate supply and exceptionally poor quality of foundry coke.

"Many remedies have been suggested, such as the use of anthracite coal—hot blast—enrichment of the blast with oxygen and even the employment of an electric furnace to super-heat the low temperature metal from the cupola. A powdered-coal-fired cradle furnace, resembling somewhat the well known cylindrical or U-shaped receiving ladle, is a recent development. This furnace was designed to eliminate the loss of temperature incident to the use of an orthodox receiving ladle.

"The use of oxygen in cupolas is being investigated at Armour Research Foundation in Chicago.

"During the year there has been a continued and growing interest in mechanization of all foundry operations—charging—pouring shakeout—sand preparation, etc.

"The 'Foundry Educational Foundation' is now well established and is doing a constructive job to attract technically trained men into the foundry industry.

"The newer foundries are being equipped with ventilating units—with floors—with provision for good lighting and heating equipment—and the industry realizes that better foundries must be built if we are to attract the right kind of personnel to operate them."

Foundry Research Concentrates On Reducing Overall Costs

Oliver Smalley, president, Meehanite Metal Corp., New Rochelle, N. Y.: "While a great deal of progress has been made in the foundry industry in acquiring the abilities, techniques and equipment for a greater production of dependable quality castings, the acquisition of these castings is still a partial bottleneck for industry. From the standpoint of the builder of most types of equipment, it has been and still is a major problem to secure what might be described as 'specification castings' which possess known, uniformly dependable, and precise engineering characteristics.

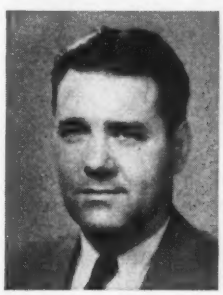
"In line with these facts during 1947 the research and development activities conducted by the Meehanite foundries concentrated on the following problems: (1) Reduced manufacturing costs through mechanization and increased overall efficiency. (2) Promotion of the use of castings in fields where castings provide maximum all-round utility value. (3) Studies of casting design as applied to machine and equipment construction. (4) True engineering sales service. (5) Mutually advantageous labor and management relations.

"Of interest to the casting user, will be the results obtained by experiments on induction hardening; the setup of formulas computing maximum stresses and deflections in certain types of constructional forms; additional studies on the effect of elevated temperatures and the interesting facts uncovered through continued investigation of strain testing.

"For 1948 concentrated efforts will be made to develop additional means to help the casting user select and achieve the right material with maximum engineering characteristics and designed to the proper shape to meet his needs. Active and intelligent cooperation between foundries skilled in the production of better castings and manufacturers intent upon producing quality products with true efficiency, will be a continued objective."

Die Casting Applications Extended to New Fields

R. W. Dively, radiologist, die casting division, The Hoover Co., North Canton, O.: "Die casting has had a very prosperous year, and there appears to be no diminution in the trend for the year 1948. Business in most die casting plants has been at such a high volume, that equipment has been operating at maximum capacity. With this condition prevalent, die casting producers are very much interested in accepting any research work for the betterment of the industry.



"One of the greatest advancements in the industry has been the co-operative research program conducted by the American Society of Testing Materials. Groups of interested people formulate the program for a study of projects pertaining to cold chamber die casting. The die design for a test casting has been approved and several dies have been produced or are in the process of completion. Other interesting projects have been outlined for study by this group. Some have been started, however, insufficient data have been obtained to produce any definite results. This cooperative program appears to be a progressive step for better understanding and dissemination of knowledge concerning die casting process.

"Die casting has entered new fields, where previously it was thought not to be suitable. This is

due to better equipment being available for the production of porosity free castings, and radiography as a nondestructive test for determination of internal quality. The latter plays an important part in establishing certain machine adjustments necessary for production of quality castings.

"The die casting industry is striving to produce a better quality product, in addition to producing castings more economically. With this goal the industry can still invade other fields where die castings can be applied to good advantage."

Higher Freight Rates Force Foundry Sand Reclamation

John Howe Hall, Swarthmore, Pa.: "The field of steel casting has not offered much development in the way of new methods during the past year. Several foundries, located far from their source of sand, are interested in the problem of sand reclamation, and as a result a number of installations are either building or contemplated, which will convert used molding sand to about the equivalent of new material. In some cases the process involves only washing and scouring, while in others the sand is burned at a red heat to destroy any organic material adhering to the grains. With freight rates increasing steadily, the cost of sand laid down at the foundry, at points involving a fairly long haul by railroad, has reached a figure that makes it possible to effect a worth-while economy by reclamation of old sand instead of hauling it away—which often involves an additional charge on the expense sheet.

"Some further progress has been made in solving the vexatious problem of graphitization prevention in high temperature service castings and several new compositions have been proposed for adoption as standard by nationally recognized specification-writing groups.

"Continued progress of welding has hastened the day when many parts will no longer be produced as complete castings, but will be assembled of cast, rolled and forged parts selected to best meet the job requirements most economically. In some cases, such assemblies will be composed only of castings, shaped as to eliminate any difficulty involved in producing the part as an integral job, while in others castings will be welded to rolled or forged parts, or both, depending upon the circumstances of each individual case."

Steelmaking Methods To Benefit Through Casting Research

Charles W. Briggs, technical and research director, Steel Founders' Society of America, Cleveland: "Technical activities of the steel casting industry moved forward with accelerating impetus during 1947. Research is being co-ordinated to operating problems to increase efficiency of production and quality of product.

"A very excellent set of studies on effect of hydrogen and nitrogen in cast steels was carried out by Battelle Memorial Institute. In these studies 41 heats of commercial and experimental steels were examined in various ways, most important of which were for relationships between hydrogen content and tensile properties, and for changes in gas content associated with alterations of practice while the steel was in the molten condition. It is believed these studies will result in many important changes being made in methods of steel making.

"Methods used for supplying feed metal to castings received further impetus by a greater appreciation of the use of necked-down risers for production castings. Detailed requirements for the applications of neck-down risers to casting sections up to 30 inches were formulated for use by the industry. Such knowledge was instrumental in decreasing costs in foundry operations.

"The industry as a whole during the past year became much interested in extending the use of core blowing operations. Principles, methods, advantages and limitations of core blowing and their effect on operational problems was given considerable attention.

"Problems dealing with cleaning room operations and the cleaning of steel castings have also received major attention. Such items as evaluation of grinding conditions, grinding wheel efficiency tests, the chipping procedure control and plant layout all received careful consideration. Likewise, a series of extensive studies were made on factors governing ease of flogging the necked-down risers.

"A better understanding was obtained of the control of molding sand and core properties through studies of the behavior of sand in contact with liquid steel. Furthermore, a new test was devised which may be looked upon as a very practical one—one that can be used by all foundries to study high temperature properties of sands.

"Research on the heat treatment of cast steels, especially in connection with the homogenization times and temperatures and their effect on the mechanical properties of cast steel was reported from two sources. This research points to the fact that long holding times and high temperatures do not increase the properties of light and medium-sectioned steel castings.

"A very excellent report was prepared by Carnegie Institute of Technology on the influence of microstructure on the mechanical properties of cast steels. Correlations were made between various rates of cooling of cast steel, microstructures developed and tensile and impact properties obtained. Results indicated there is no relation between the as-cast microstructure and subsequent structures and properties developed after heat treatment."

Malleable Iron Industry To Need More Pig Iron in 1948

James H. Lansing, consulting engineer, Malleable Founders' Society, Cleveland: "With less pig iron available for its use in 1947 than in 1945 or 1946, the malleable iron castings industry produced, in 1947, a greater tonnage of malleable castings than in either of the two preceding years.

"This accomplishment required the use of a greater amount of steel, malleable, and gray iron scrap, a greater use of ferro alloys to maintain the silicon and manganese content, and of carbon-raisers to maintain the desired amount of carbon. These substitutions for pig iron necessitated a constantly closer

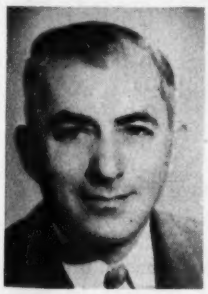
control of melting operations and analyses.

"When steel scrap is used in amounts greater than is customary, carbon and silicon content of the charge, or of the final metal, must be raised. The same is true of malleable scrap, although to a lesser degree. In the case of gray iron scrap, but a small amount may be used, due to the impaired properties which would result from too high a phosphorus content of the final product.

"Although the malleable industry has maintained, and even increased, its production by the partial use of substitutes for pig iron, such practice is more difficult, time-consuming, and costly. To maintain the demands to be made upon them in 1948, malleable producers will require more, rather than less, pig iron, and trust therefore that such additional urgently needed melting stock will be made available to them."

1947 Die Casting Output In Excess of War Period

Charles Pack, vice president, Doehler-Jarvis Corp., New York: "During the war the die casting industry, devoting all of its facilities to the production of war materials, reached a record peak of production which was far in excess of previous peace time requirements. Many die casting manufacturers expanded their facilities and the problem of keeping these facilities in operation during the post-war era caused grave concern.



"However, less than 2 years after VJ-Day, all of the nation's die casting facilities are in full operation and their output is in excess of the wartime record.

"Shortage of iron and steel has been an important factor in this unexpected demand for die castings. Fortunately, the basic raw materials for the die casting process, mainly high grade zinc and aluminum, have been available and the die casting industry has been able to help American industry cope with the iron and steel shortage.

"Die casting production will reach a new high during 1948 if producers of high grade zinc and aluminum will be able to supply the raw materials.

"Whether or not the die casting industry can continue its present rate of expansion will be determined more definitely when and if the supply of iron and steel again becomes plentiful. In the meantime, the die casting industry must put its house in order, improve its methods, step up its efficiency and prepare for the day when it must again face the bitter competition of the ferrous metals."

Cost and Scarcity of Labor Compels Operational Study

P. J. Potter, executive vice president, Pangborn Corp., Hagerstown, Md.: "Foundry labor cost and scarcity throughout the nation cause management to study each operation with the idea of reducing required labor hours, easing the physical requirements and improving working conditions. In the cleaning department of foundries doing repetitive work such as motor parts, brake drums, etc., the trend is toward the continuous conveyor through blast machines to the next operation. Foundries performing jobbing work are vitally interested in making each operation—removing cores, blasting, chipping and finishing, as mechanized as possible and so arrange their operational sequences to lessen handling.

"Cleanness is being stressed more and more by casting users and the foundry cleaning departments are satisfying their customers' requirements by using modern equipment and close inspection."

New Developments Noted in Ferrous Foundry Industry

E. B. Sherwin, president, Chicago Hardware & Foundry Co., North Chicago, Ill.: "Among the developments during the past year in the ferrous foundry industry, more particularly the gray iron foundry, are the following: A phenolic resin binder has been developed for iron foundry use, but has not yet reached the publication stage. Laboratory and foundry trials show that these binders give high strength comparable with those obtained with oils; they cure much faster than oils, especially in thick sections; their gas evolution is low; and they do not form obnoxious gases and smoke during baking and pouring. Their application in general practice appears to have a bright future.

"Chemically coated molding sands began to receive attention in several laboratories about the end of 1945. Up to the present time they have been tried out and the results of experiments show that these new coated sands combine low moisture content with high permeability This type of sand has some disadvantages, namely, too high cost and increased generation of smoke at the shakeout. Actual use will determine the relative merits and value of chemically coated sands. Although from the present outlook, the development seems to warrant close attention.

"The British Iron and Steel Institute has announced the results of investigation in steel foundries on replacing linseed oil in core binders by aromatic extracts removed by solvents from the lubricating oil fraction of crude petroleum. It has been found that, under various conditions, 40 to 50 per cent of the linseed oil could be replaced with these extracts without change in strength or foundry properties, and without doubt, can be duplicated in iron foundries.

"There has been considerable development in thermo setting synthetic resin binders in core mixtures allowing the use of dielectric heating of cores.

"On the whole, there seems to be an increased interest in research during the past year as foundrymen seem to be awakened to the fact that it is only by research that they will be able to improve their product, thereby benefiting the users of gray iron castings.

"Considerable interest is being shown in improved techniques to obtain sound and uniform structure throughout castings, particularly those of varying sections.

"During the war the lost wax process was developed to a considerable degree for the casting of precision castings. Variations of the process are now being tried out with gray iron and further developments are being looked forward to in the near future, which will enable mass production of gray iron castings of various weights by this process.

"Of interest to all users of gray iron castings is the development of the use of phenolic resins for patterns.

"The above information is condensed from a report written by H. H. Lownie Jr., research engineer, Battelle Memorial Institute, Columbus."

Forging and Forming

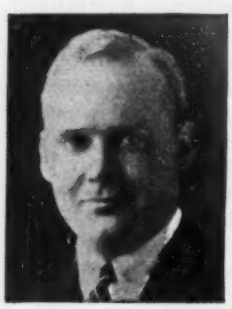
Stamping industry to feel steel shortage until late 1948. . . Wider use of die forgings cuts product costs. . . New tools boost expansion of sheet metalworking plants. . . Press problems studied to jump hourly output. . . Stainless alloys forged successfully

Wider Use of Die Forgings Decreases Product Costs

Waldemar Naujoks, manager, forged valve division, Ohio Injector Co., Wadsworth, O.: "A definite accelerating trend is noted toward the use of die forgings in mechanical equipment, not so much for the known and desirable qualities of strength and reliability, important as they are, but because of overall economy afforded by the use of forged parts. Close uniformity in size, uniformly higher machining production, better heat treating results, less loss in machining scrap because of defective blanks, and greater ease in assembly, have permitted an improved product at lower cost. Less manhours are an important consideration today."

User's Press Problems Studied To Gain More Hourly Output

R. E. Dillon, president, Lake Erie Engineering Corp., Buffalo: "Today, in the use of hydraulic presses, the emphasis is on cost reduction through advanced methods of operation and minimum maintenance. We are constantly studying the user's problems in order to give him more hourly production and to simplify design so as to keep the equipment running full time.



"Considerable work was done in the field of plastic molding for improvement of the product while decreasing cycle time with resulting lower costs. We also assisted in the standardization of plastic material by the introduction of a new plasticity tester.

"Utilization of waste wood was thoroughly studied by us and a process evolved which will make available many new wood products. This conservation of wood waste should materially lower the cost of building materials.

"In the metal-forming field it was possible to combine operations and perform on presses many operations previously done manually.

"We feel that the successful hydraulic press manufacturer must offer the customer not just a press but a production unit which will afford the user lower production costs."

Larger, Faster Equipment Built by Press Industry

John F. Herkenhoff, president, Minster Machine Co., Minster, O.: "High production requirements during the war were met by techniques and developments perfected under supply contracts. Research was provided, which in just a few years accomplished advancements that would have been prohibitive in cost to private enterprise. This valuable experience is now available to civilian production and is being repeatedly applied to fill the unprecedented demand for goods, with minimum labor costs.

"Leading in these developments is the use of ferrous and nonferrous sheet materials, through working with dies and presses, to replace cast and machined parts. The effect is the reduction of material used, material cost, considerably higher production with less handling, less labor and accurate interchangeable parts.

"Greatest trends are elimination of machining and metal removing with dies; multiple or progressive operations in one die and multiple dies in one press. The press industry is particularly receptive to this trend by designing and building increasingly larger, faster and safer equipment, thereby producing a greater quantity of accurate stampings with the minimum number of operations, at a lower cost."

New Tools Boost Expansion of Sheet Metalworking Plants

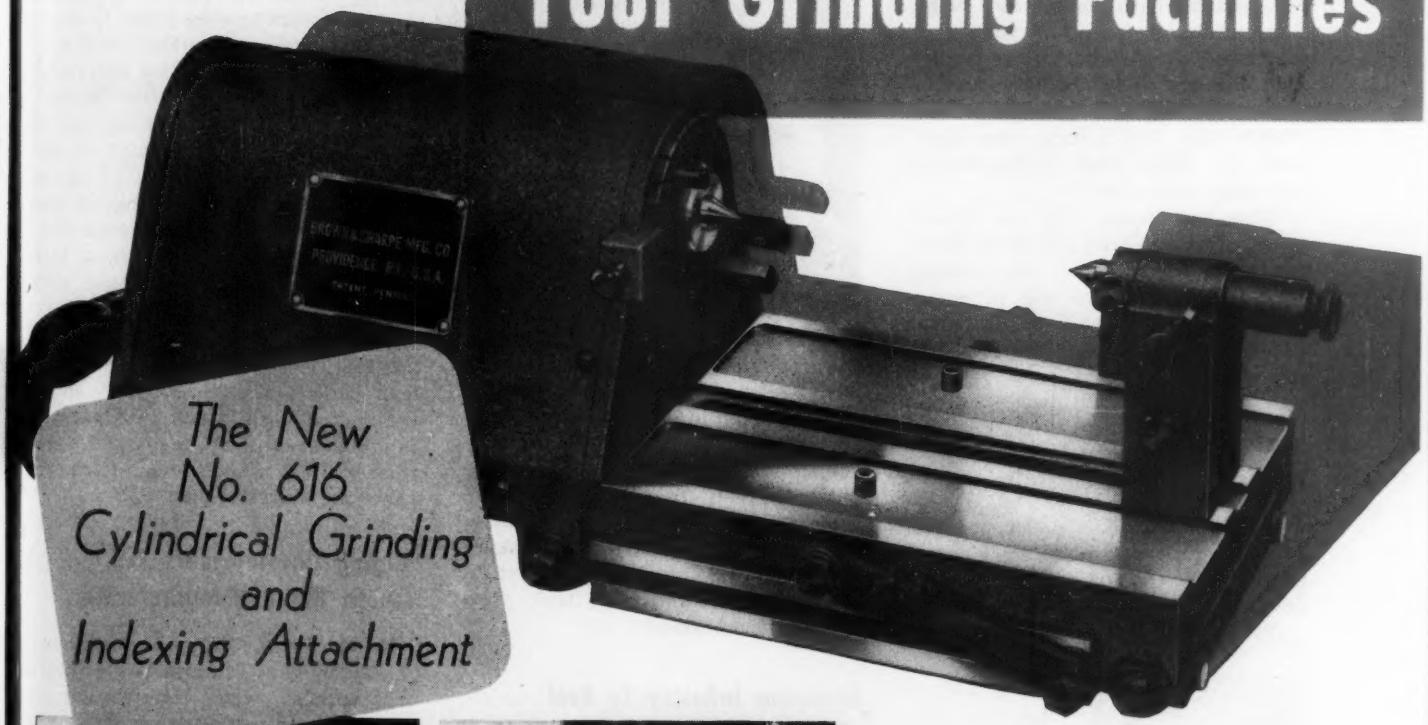
J. T. Dillon Jr., president, Struthers-Wells-Titusville Co., Warren, Pa.: "Technical progress in the development of new tools will do much to encourage expansion of present sheet metalworking plants as well as the establishment of many new fabricators, small and large. Even though production figures are at an all time high we are confident that expansion will continue. We are so sure of this that Struthers Wells has developed two new models in its family of tangent benders to fulfill the demand for less expensive machines.

"These new machines supplement the standard single wing tangent benders and are entirely new units put on the market as a service to fabricators for whom the original models would not be economically practical—for lighter work, smaller plants, or plants where several machines are required in the production line."

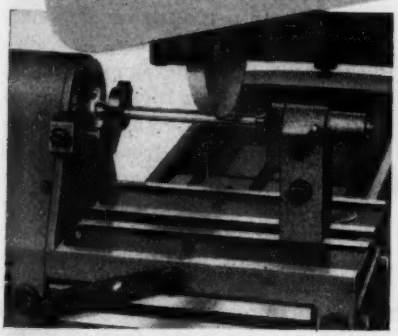
Holds Stamping Answer to Low-Cost Mass Production

Sam Morrison, vice president, Morrison Steel Products Inc., Buffalo: "Because war emergencies clearly established stamping as the answer to low-cost mass production, designers in all fields have concentrated exclusively

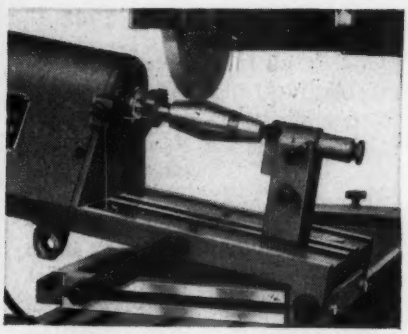
HERE'S A SIMPLE WAY to enlarge Your Grinding Facilities



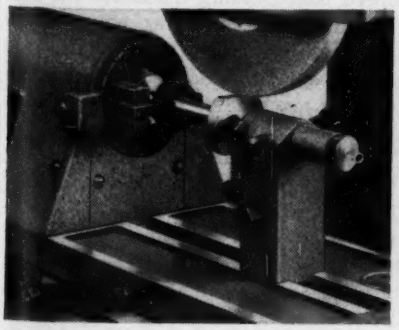
The New No. 616 Cylindrical Grinding and Indexing Attachment



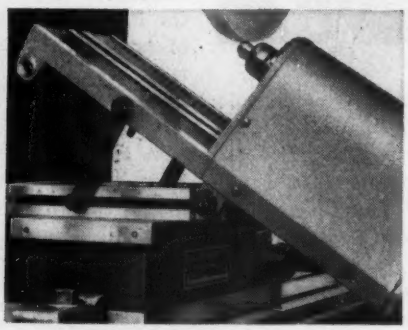
● Grinding work held between centers. Tailstock center is withdrawn for work change by simple swing of lever.



● Grinding taper shank. Attachment is readily adjustable to the desired taper.



● Grinding parallel flats using index plate. Index plate has 24 slots — is locked or released by plunger.



● Angular grinding of work held in spring collet. Attachment is held on permanent magnet chuck.

. . . for Surface Grinders

This new Brown & Sharpe Cylindrical Grinding and Indexing Attachment is designed to be used on surface grinders for dry grinding small cylindrical work, tapers and work requiring indexing. It is a simple way to enlarge your grinding facilities and may make unnecessary an investment in extra equipment.

Straight cylindrical or tapered work is ground between centers or, if ½" diameter or less, can be held in indexing spring chuck. Indexing is performed with headstock index plate or with interchangeable indexing spring chuck.

Centers swing 6" diameter; take work 5¼" in length. Maximum grinding angle, 45°. 1/60 H.P., 115V., A.C. motor is completely enclosed. Write for illustrated folder. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

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on its use in their product applications.

"The Mor-Sun pressed steel furnace introduced the practicability of this process in the heating industry—a process which is also revolutionizing the plumbing and sanitation fields. For instance, bathtubs are now being mass produced from 125 pounds of sheet steel at a fraction of the former time and cost. The resulting savings in distribution and installation are considerable. Same facts are applicable to sinks, fixtures, appliances and many other products.

"New techniques, such as atmospheric brazing, cold extrusion, modern press designs, etc., are lending new impetus to the use of metal stampings in competition with plastics, glass, plywood and other materials and processes."

Heat Resistant Stainless Alloys Forged Successfully

C. H. Smith Jr., president, The Steel Improvement & Forge Co., Cleveland: "One of the outstanding developments in the forging industry during the past decade has been the discovery of the techniques necessary to forge the heat resistant stainless alloys necessary for gas turbine applications. The past year has seen a continuation of this work and the further development of forged turbine blades in extremely intricate shapes. The problems involved in this work can be readily visualized by realizing that these materials must be fabricated at temperatures only a few hundred degrees above the temperatures at which they will be required to operate. Closer tolerances on this type of work has also been an achievement of the past 12 months.

"A second important development has been the adoption of methods to broaden the type of work which can be done on mechanical forging presses. Certain types of forgings have been produced for some time on presses with real economies in time and money. As further progress is made in converting hammer forgings to press forgings, similar savings should be realized."

Erection of Record Size Tanks Creates Added Welding Problems

Fred L. Plummer, director of engineering, Hammond Iron Works, Warren, Pa.: "Steel plate fabricators and erectors have recently completed the construction of a ten million gallon covered steel water reservoir having a diameter of 292 feet. A gas holder 276.6 feet in diameter and 227 feet high, having a gas storage capacity of ten million cubic feet, is now being erected. Major companies in the petroleum industry are now planning for the use of oil storage tanks having diameters up to and exceeding 200 feet. These examples are typical of the larger storage units which various industries are asking manufacturers to design, fabricate and assemble under difficult field erection conditions."

Stamping Industry To Feel Steel Shortage Until Late 1948

Tom J. Smith Jr., president, Pressed Metal Institute, Cleveland: "Pressed metal manufacturers were unable to meet the demand for stampings during 1947 due to lack of sufficient quantities of sheet and strip steel and due to the mal - distribution of available supplies.

"Surveys conducted by the Pressed Metal Institute disclosed that stampers could have used from 100 to 450 per cent more sheet and strip steel if it had been available.

Many plants have had difficulty in maintaining an 8-hour run on any press without running out of the particular steel required by the stamping being made. Many customers of stampers have resorted to the gray market to obtain the steel for the stampings.

"Today the stamping industry generally cannot secure from steel mills and warehouses adequate sheet and strip steel to meet the demand for stampings used in and products needed by the consumer, for the following reasons: 1. Diversion of sheet steel to 'gray markets;' 2. unequal allocations of sheet steel by steel mills between owned stamping companies and independent stampers; 3. shortage of scrap; 4. refusal of certain steel producers to ship direct to small users; 5. refusal of certain steel producers to accept orders for hot rolled steel as in the past; 6. refusal by certain mills to accept and fill orders from old customers located at considerable distance from mills; 7. refusal of certain steel mills to recognize historical position of stamper with companies absorbed by steel mill; 8. lack of sufficient ingot and rolling mill, pickling and hot roll capacity.

"Prospects of the stamping industry for 1948 include: More orders than can be filled; continued shortage of steel until late in 1948; a probable disturbed scrap, ingot and semi-finished steel market due to exports under the Marshall plan."

Forging Developments To Benefit Many Manufacturers

R. H. Jones, National Machinery Co., Tiffin, O.: "The immediate future will witness wide introduction of some recently perfected revolutionary developments in the field of forging. Benefits of these developments will accrue to the user in the form of more accurate, lower weight, minimum finish forgings at greatly reduced costs.

"Outstanding among these developments is new radically different auxiliary equipment for forming preliminary blanks for the forging machine and Maxipres. These preformed blanks are produced from hot bar stock on a mass-production basis, and are finish forged on the original heat.

"Another method utilizes high speed cold heading machines for producing the preliminary blanks from wire. In this case the blanks are heated and finish forged on either the forging machine or Maxipres, depending upon the character of the job.

"Great majority of jobs previously turned down for forging machine or Maxipres production—because of the extensive gathering, drawing or reducing operations involved in making preformed blanks—can now be handled on such equipment to marked advantage. Any job, regardless of size or shape, previously ruled out on the forging machine or Maxipres for the reasons just mentioned, should be reconsidered in the light of these new developments."

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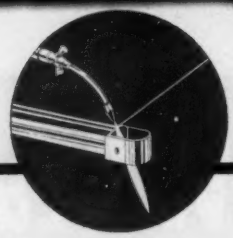
Joining and Welding



Double-duty fastening demands increase . . . Arc welding of new metals creates unusual problems . . . Strategic use of metals in machine tools provided by latest joining methods . . . Late developments boost resistance welding

Pressure Welding Used To Join Steam Piping

R. A. Kubli, development engineer, The Linde Air Products Co., New York: "Oxyacetylene pressure-welding can produce quality joints in steam piping which require no internal broaching or cleaning. This has produced a marked trend toward general adoption of the process by steam equipment manufacturers. Two of the large American manufacturers are now pressure-welding carbon-steel boiler tubing as a means of utilizing short lengths.

"The internally clean joint, which requires no machining, permits bending to section of a unit to the proper pattern before welding. A great saving in floor space, together with increased handling ease, results from following this procedure."

Notes Rapid Progress in Structural Welding

La Motte Grover, Air Reduction Sales Co., New York: "Interest in welded construction on the part of bridge engineers, structural designers, steel fabricators and technical schools, has continued to mount rapidly, having been stimulated by the extensive and eminently successful use of welding for various kinds of steel fabrication in the war production program. A good many structural engineers and a number of state highway bridge engineers have prepared plans for welded construction, and quite a number of welded building frames have been constructed. However, several prevailing circumstances have delayed a realization of the volume of structural welding that one would expect to be reflected by the great amount of interest in this field. These conditions all seem to be of a temporary nature associated with post war recovery.

"Basic economic reasons for the adoption of welding by quite a number of structural steel fabricators, architects and engineers, as well as for our program of production for the recent war, are thoroughly sound. They are equally applicable in war and peace times. As the presently existing conditions of our peculiar and unnatural state of political economy disappear, we can look forward to a very rapid increase in the use of structural welding."

Tremendous Savings Realized Through AC Arc Welding

C. P. Croco, manager, welding department, motor division, Westinghouse Electric Corp., Buffalo: "Development of suitable coated electrodes now makes the use of alternating current arc welding available at tremendous savings to industry. Electrodes stabilized to operate on alternating current with open circuit voltages as low as 65 volts now makes alternating current welding practical and even safer than direct current welding.

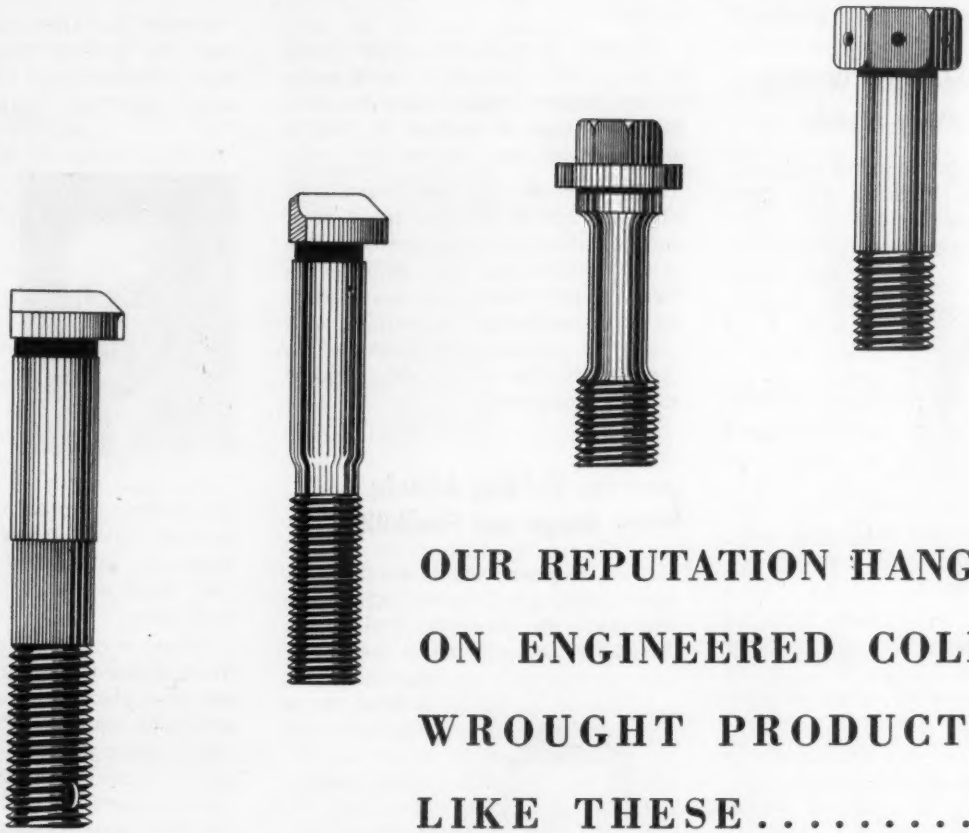
"Practical elimination of arc blow makes faster welding at higher currents possible with an increase of speed from 20 to 30 per cent when alternating current is used. This means that less labor and fewer machines are required to do the same amount of welding. Industry is using approximately 25,000,000 pounds of electrode per month and very conservative figures show that savings as much as $1,800,000 per month, or $12,600,000 per year could be made if alternating current welders were used."

Modern Methods Improve Fastener Strength, Accuracy

Harry O. Mc Cully, vice president in charge of sales, Russell, Burdsall & Ward Bolt and Nut Co., Port Chester, N. Y.: "It is not a simple matter to attempt to outline the advancement in the fastener field in a few words. Standardization of our product many years ago, helped the mass production industries break all volume records. This standardization program, in itself, was not of easy attainment, but, because of it, the average person is not likely to recognize the progress that consistently has occurred in the quality of our product. What the naked eye may fail to see is the extra strength and the greater accuracy of the fastener of today compared with the avarage pre-war product. And then, improvements generally are accomplished at greater speed.

"The mass production of high tensile screw and other fasteners to close tolerances has been a boon to many industries. The weight of assembled units has been reduced, the actual cost of assembly lowered. Remember, in any analysis, it is the cost of using a fastener that counts.

"The improvement of manufacturing facilities to pace this progress, today, is quite a burden on the producer. Last year, our company spent $2 million in improvements. Now, we are committed for an additional $5 million in our expansion and rehabilitation program. We, in the fastener



OUR REPUTATION HANGS ON ENGINEERED COLD WROUGHT PRODUCTS LIKE THESE.....

Here are four of our metal fasteners selected at random. Although each one is merely a metal pin, headed and threaded, costing only a few pennies, each one has been designed and wrought with infinite care. In all assemblies where metal fasteners are used, the fasteners bear the greatest burden of responsibility. Therefore, CHANDLER stands back of the work *these* fasteners do for *you*. Our reputation actually hangs on our cold wrought engineered products. No wonder, then, that we bend every effort toward living up to our purpose: one product, well made, designed painstakingly and executed to particular specifications for practical purposes.

CHANDLER PRODUCTS CORP.

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industry, recognize the necessity for continually moving ahead in our effort to keep abreast of or anticipate tomorrow's demand for our product."

Inert-Gas Shielded Arc Welding Applicable to Many Metals

H. T. Herbst, development engineer, The Linde Air Products Co., New York: Inert-gas-shielded arc welding, recently introduced commercially for welding magnesium, has made rapid strides in entering the field of fabrication of nearly all types of metals. One outstanding characteristic is the fact that, with the exception of copper, flux is not required in the welding of any of the common commercial metals and alloys.

"Some of the most notable applications of the process, from the standpoint of volume of goods produced, have been mechanized operations where high welding rate and large volume output are attained."

New Applications Noted for Submerged Melt Welding

Norman G. Schreiner, manager Unionmelt service and development, The Linde Air Products Co., New York: "Several applications of the submerged melt welding process during the past year are noteworthy. One of these is the fabrication of high-yield-strength line pipe of 26-inch diameter and larger. After welding the longitudinal joint, the tube is hydraulically expanded against a die beyond the yield point of the material for the purpose of rounding it and increasing its yield strength beyond the required minimum of 52,000 pounds per square inch.

"A large number of all-welded locomotive boilers have been produced by one of the leading builders and are now in service on some of our major railroads. Main joints of both boiler and firebox are Unionmelt welded.

"Further development would seem to me in the direction of using some of the higher-tensile steels to take full advantage of savings in weight and material and fabrication costs.

"The process also has become an effective tool in the hands of steel mill maintenance departments. Use of the process has been extended to those welds which are inaccessible to, or uneconomical for, welding with the fully mechanized machines by the introduction of portable, flexible welding machines."

Inert-Arc Welding Affords Wider Range and Flexibility

G. O. Hoglund, chief, welding section, jobbing division, Aluminum Company of America, Pittsburgh: "Most significant factor in expanding the structural applications of aluminum alloys is the rapid development of arc welding procedure. New equipment and methods for welding these materials with a tungsten arc in an argon atmosphere have been perfected. Commercial applications are an outgrowth of practices developed in World War II. The argon shielded tungsten arc, or inert arc, or heliarc, as it is variously known, provides greater flexibility and a wider range of applications than previously established welding practices. It is feasible by this method of welding to make joints in any position—downhand, vertical, or overhead. Fluxing materials are unnecessary. Consequently, the difficulties from incomplete or lack of flux removal that occur with other welding methods are entirely eliminated. The process is simple to handle and training of operators is accomplished in a shorter time than required for metal arc or gas welding. Weld contours are uniform and smooth; thus, finishing costs are low.

"The process is useful over a wide range of applications. Thicknesses from 0.050 up to 2½-inches have been welded and both butt or fillet joints are made with equal facility."

Demand for Double-Duty Fastening on the Increase

George A. Tinnerman, vice-president and general manager, Tinnerman Products Inc., Cleveland: "The most important factor influencing our plans for increasead production during 1948 is that more and more manufacturers are becoming convinced that improved fastening devices can play a mighty important role in cost-reducing programs. We are meeting with greatly increased demand for 'self-retaining' Speed Nuts that eliminate costly nut-attachment operations.

"There is also increased interest in those of our fasteners that are snapped into place to provide a friction lock and thus completely eliminate the need for threaded fasteners. New fasteners are constantly being developed to combine two or more functions, to speed up assembly lines and reduce production costs. The ever increasing demand for these types of fasteners has made it necessary for us to extend our general marketing plans and to provide for plant expansion in the very near future."

Use of Low-Hydrogen Welding Electrode Gains Steadily

Pierre Champion, president, Champion Rivet Co., Cleveland: "Low-hydrogen, or ferritic type of welding electrode will receive wide acceptance as this electrode makes it possible for the fabricator to employ the welding process in the joining of steels that heretofore have not been considered weldable, such as high sulphur free machining steel, and the low alloy grades.

"This type of low-hydrogen, or ferritic electrode was first developed towards the end of the war for fab-

ricating armor plate with the view of conserving critical materials such as required in the stainless types of electrodes. Since the termination of the war much improvement has been made in operating characteristics of low-hydrogen electrodes with the result that the welding fabricators have recognized, and are taking advantage of the wider range of weldable steels made possible by this electrode development."

Arc Welding Applied to New Metals Creates Problems

Robert E. Kinkead, consulting engineer, welding, Cleveland: "Any general survey of conditons in the welding industry as of 1947 will yield optimistic trend in the matter of increased use of welding and brazing as a method of manufacture. Consumption items involved in welding operations has steadily increased in volume since the immediate postwar valley. Capital expenditures for new equipment have been brisk only where new applications of the processes are made on a large scale as in the case of manufacture and repair of agricultural equipment. This has boomed throughout the middle west in particular.

"The very breadth of application of electric arc welding application to new metals and alloys is creating problems among users which are becoming severe. Even the medium size user needs from 100 to 250 specifications of welding electrodes in stock. This includes variation of size specification. Many specifications deteriorate from moisture absorption.

"Users, for the most part, lacking year round air conditioning storage facilities, never know how much of their stock is usable. All position electrodes and some hard facing electrodes are subject to such deterioration. Scrapping the electrodes would cost less money than to use them with necessary rewelding due to porosity. Of course that are many applications of welding electrodes where porosity is of practically no consequence.

"Increased impetus to reduction of cost of using stainless surfaces has come from additional suppliers coming into the market with clad steel."

Sees Need for Simplified Resistance Welding Controls

G. N. Sieger, president, S-M-S Corp., Detroit: "Uses of resistance welding demonstrated at the 1947 national convention of the American Welding Society indicated a need for simplified controls. Industry seems to want something not so complicated, perhaps something more flexible in its application.

"One of the outstanding problems that concerns our industry is power supply. In reviewing some of the larger installations of resistance welders, we see that improvements can be made in the use of energy; either less power should be used or more welds effected with the existing power. Balanced 3-Phase power is of interest. A novel installation exhibited at the Chicago metal show was a kinetic stored energy machine. It is not offered as a complete answer but is certainly a trend toward the solution of a serious problem confronting us. Another significant trend is the desire on the part of the resistance welding industry to make the process a science instead of an art. Engineers are continually searching for fundamental data."

Fracture Bend Tests Used To Evaluate Weldability

John J. Chyle, director of welding research, A. O. Smith Corp., Milwaukee: "Latest trend in evaluating weldability of carbon steels has been focused on fracture bend tests as related to ductility or energy absorption at temperatures varying from atmospheric to sub-zero. This new outlook was given impetus by Dr. Kinzel's Campbell Memorial lecture during the 1947 Metals Congress. This relationship is of practical importance in welded fabrication, and promises to have a widespread effect on the quality of steel in the near future, as soon as competitive conditions in the steel industry are again operative.

"There is considerable interest in the field of nonferrous welding, and the developments of some of the newer processes indicate that a sizeable amount of welding in the nonferrous field will soon materialize. The nonferrous materials are especially useful for low temperature applications. This has not materialized in the past because of lack of suitable welding methods for fabrication. The inert arc welding process is going to play an increasingly important part in this new application."

Various Welding Methods To Affect Parts Design

Joseph W. Meadowcroft, assistant plant manager, Automobile Body Div., The Budd Co., Philadelphia: "Through present and future research and development in the welding field, much progress will be made in the manufacture of both old and new products which are fabricated by the various methods currently available for welding.

"The products will be designed so that regardless of the method of welding applied, they will be produced in larger quantities, of a higher quality, and at lower costs."

Drive Large Rivets Cold Using Controlled Safe Pressures

W. E. Fowler Jr., sales engineer, Riveting Apparatus Inc., Pittsburgh: "During the past few years we have been introducing to the engineering fraternity, and the structural fabricators a practice of driving large rivets cold using automatically controlled safe pressures. This method is gaining in favor not only from the economies effected, but also from an engineering viewpoint.

"There is no special grade of steel

required, standard structural grades are used. In many cases the actual driving pressure is lower for cold driving when the pressures are controlled than it is for hot driving with free rivets. A number of the engineering societies are recognizing the value of this practice as is the building inspection bureau in a number of our larger cities.

"A goodly number of important structural fabricators are now equipped for cold driving using pressure controls and many more are favorably considering the installation of Osborne automatic pressure control."

New Alloys and Fluxes Improve Aluminum Brazing

H. A. Huff, Air Reduction Sales Co., New York: "Development of suitable brazing alloys and fluxes for aluminum has brought several advantages to the fabricator of the increasingly popular light metal. Complicated assemblies and thin sections, not commercially practical to join by other methods, can be mass produced by brazing. Overall cost per joint is in many cases far lower than other methods.

"Problem in brazing aluminum previously revolved around the critical melting point range of the alloys, and it is the successful development of brazing alloys which, while aluminum-base themselves, still melt at a safe distance below the parent metals; this has been the key to solving the problem. Teamed with suitable fluxing agents, which cope with the inherent aluminum oxide layer and at the same time 'signal' the approach of the base-metal melting point by their own liquefaction, the new brazing alloys have already proved popular in mass-production applications, particularly as applied with the oxy-acetylene torch.

"While the process is at present limited to a group of relatively popular general fabrication alloys, growing interest should before long result in the development of further brazing materials and additional 'brazable' alloys, thus extending not only the scope of the process but also the range of possible uses of aluminum."

Flash Butt Welding Applied To Heat Resisting Alloys

I. A. Oehler, director of metallurgy and research, American Welding & Mfg. Co., Warren, O.: "During the past year, flash butt welding of heavy section (over 1 square inch) copper and aluminum for electrical conductivity purposes has been accomplished with marked success. In the fabrication of cyclotron magnetizing coils, it was found that welds produced by flash butt welding had electrical conductivity within one-tenth of 1 per cent of that of the parent material.

"The process is also found in wide application on stainless and heat resisting alloys for structural parts where the generally allowable 100 per cent weld efficiency of the joint permits the use of the minimum section of relatively high priced material. Factors affecting weld quality for these materials can be determined by metallurgical investigation. Modern automatic welders can be set to reproduce proper welding conditions so that with a good production control procedure, welds of consistent high quality are assured."

More Versatility Noted for Arc Welding Process

A. N. Kugler, Air Reduction Sales Co., New York: "Recent developments in the arc welding field, in machines, equipment, and techniques, have continued the wartime trend toward more and more versatility for the arc welding process. Refinements and improvements have been numerous, particularly in the electrode field.

"With increasing interest in, and use of, stainless steels, one of the most important jobs for arc welding is on these alloys. There are now available highly satisfactory electrodes in AC-DC, and DC types for all stainless alloys except the straight chromium types, and excellent DC electrodes for these. Since the bulk of production stainless welding is on chrome-nickel analyses, availability of satisfactory electrodes for either type of current tends to make it far easier for the fabricator or welding shop to meet production demands with available equipment, or to suit the metal analysis or current characteristics of the electrode to the requirements of the job."

Metals Placed Strategically in Welded Machine Tool Designs

A. F. Davis, vice president, Lincoln Electric Co., Cleveland: "The machine tool industry is faced today with a vanishing sellers market and a WAA surplus market that can only be invaded with new improved types of machinery. In their constant effort to improve their products and reduce costs, forward looking machine tool manufacturers are turning in greater numbers to the advantages of using welded steel fabrication for various jobs.

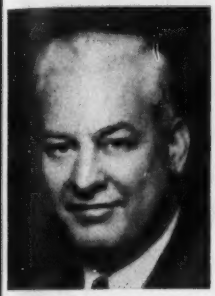
"Welded design has in many cases been the engineer's means of creating machine tools of increased capacity operating at higher speeds and with greater precision. Freed from the restrictions imposed on design by previous methods, the engineer using welding is able to place metal most economically where it is needed. Greater rigidity and freedom from resonance thus achieved permits a wider operating range of the tool. Welded machine tools can also be built more economically to special specifications. A welded design is a fluid design. The engineer can redesign and change freely without consideration for pattern and die costs or fear of obsoleting a large stock of castings.

"Accompanying these improvements in operation, sought through the use of welding, are frequently starting reductions in manufacturing costs. Die and pattern costs are eliminated; overall machining time is reduced through the more accurate placing of metal; the overall weight

is usually reduced. In addition, the whole manufacturing process is put under the control of one plant, thus reducing overhead as well as permitting more freedom in working out the best manufacturing sequence."

Inert-Gas Shielded Arc Welding Available for Mass Production

H. O. Jones, Air Reduction Sales Co., New York: "The past year has seen a steady and continued development of inert-gas-shielded arc welding, or Heliwelding. The process, only recently limited to light manual work, has been brought to full availability by the introduction of heavy duty equipment, machine and automatic means of application, and the results of long and intensive research into the nature and behavior of the inert-gas-shielded arc.



"Where the early manual equipment was limited in its current capacity, and hence in the range of work it could handle, to about 100 amperes, the water-cooled heavy-duty manual equipment now available can be used with double and even triple such currents on a steady production basis. Machine electrode holders have been introduced which in conjunction with precision jigs, make repetitive operations possible with uniformly good results."

Submerged Arc and Inert-Gas Welding Improved

R. B. Lincoln, director, National Weld Testing Bureau, Pittsburgh Testing Laboratory, Pittsburgh: "Recent developments and improvements in submerged arc and in inert gas welding have contributed materially to progress. These two processes are related in that they permit a fully shielded arc without a coating on the filler metal. This in turn facilitates using filler metal in long lengths automatically fed into the arc and, in many cases, permits higher currents and higher welding speeds.

"Automatic arc welding is attractive both from the viewpoint of quality control and cost. Current, voltage, speed, etc. are under better control and this favors a uniform quality. We were able to do some automatic welding several years ago by using lightly coated rods, but the quality of the metal deposited was inferior to that from a heavily coated electrode, or the newer processes.

"Semiautomatic welding gives us many of the advantages of automatic welding and may be used in some applications difficult to handle with fully automatic equipment."

Resistance Welding Expands Through New Developments

Fred Johnson, president, Progressive Welder Co., Detroit: "There have been and are continuing to be so many new developments in the resistance welding field that it is almost impossible to summarize them. Marketwise, not only has there been a large expansion in the use of the various resistance welding processes in industries already using them previously, but new industries not formerly large scale users of these processes are adopting them for long lists of operations. Again, resistance welding—once limited to areas where there is considerable power supply—is now reaching into smaller communities as the result of new developments which have eliminated the obstacle of enough power.

"In the true mass-production industries, such as the automotive, the trend generally is toward larger and more complex machines which combine a greater number of operations. This includes a considerable increase in the number of transfer type machines produced. Prime reason of course is the desirability of eliminating as many handling operations as possible between welding operations.

"Since lifting of arbitrary restrictions on resistance welding in aircraft, there has been a considerable expansion of its use in that field, paralleling the intensive tooling along this line by manufacturers of stoves, refrigerators, radios, washing machines, etc.

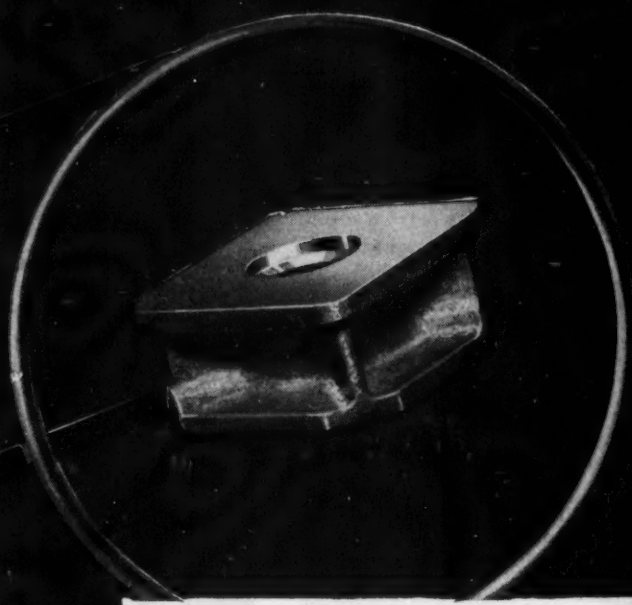
"In the multiple spot-welding machines for large industries there has been a marked increase in the demand for multiple-transformer machines. These machines make anywhere from 20 to 150 welds at one time, the use of multiple transformers permitting the welding of spots in groups simultaneously for increased output of parts per machine hour. For instance, complete automobile doors are now welded in one setup.

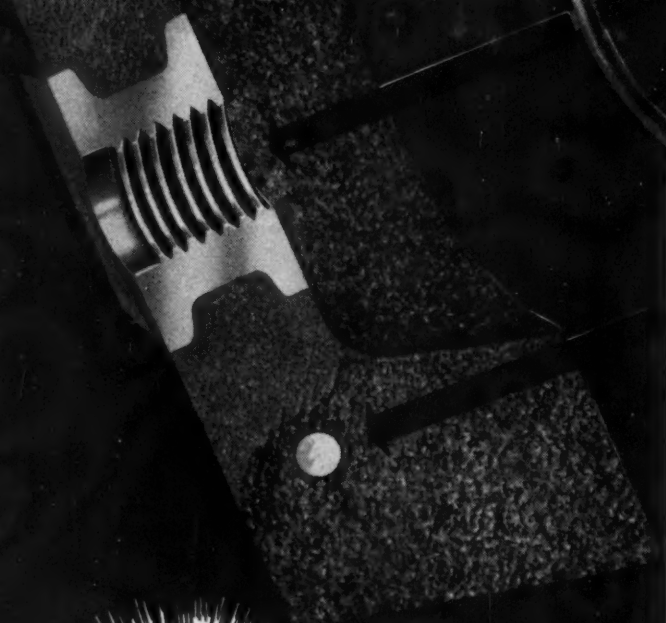
"Ability to make more welds simultaneously has also been one reason for the increased popularity of projection welding—a second advantage being the ability to make welds without surface markings. The process also permits welding on of brackets narrower than those which can be successfully spot welded."

Investigations Help Fabricators Select Steels for Spotwelding

J. Heuschkel, manager, welding section, Westinghouse Electric Corp., East Pittsburgh, Pa.: "Welding in all its branches is continuously undergoing a progressive change from an art to an applied science. The objective is improved quality and increased production within competitive cost limitations. The medium of transformation is through the expanded use of industrial research, on both basic and manufacturing fields. Improved facilities for welding education are required to provide maximum returns from the masses of information being accumulated.

"One of the more important contributions during the past year in the resistance welding field has been a determination of the properties obtained from both heat treated and 'as made' spot welds in both hot and cold rolled carbon steels up to ½-inch in thickness and up to 1.10 per cent carbon content. Extensive laboratory studies made on these welds provided a satisfactory background for explaining the results obtained from standard physical tests.





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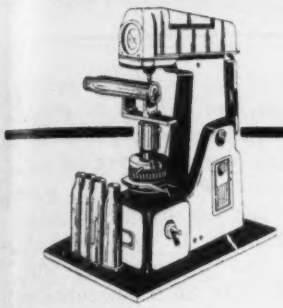

Inspection and Testing

Importance of basic government research recognized. . . X-rays gage hot strip steel during high-speed rolling. . . Spectrochemical analysis by direct intensity measurement now possible. . . Statistical methods grow as inspection tool. . . Oxygen in open hearth intensifies need for closer charge control

Industrial X-Ray Saves Manufacturer $250,000

R. G. Tobey, x-ray division, Eastman Kodak Co., Rochester, N. Y.: "With one automobile manufacturer reporting a $250,000 saving in twelve months' production of crankshafts by use of industrial x-ray, it is easy to understand why the use of x-ray control and inspection is expanding. Many new x-ray installations have been made in the last twelve months and more are on order for installation this year. While not a cure-all, x-ray is proving a must, both costwise and qualitywise, in fields ranging from the heaviest castings and pressure vessels through a variety of materials and thicknesses down to small mechanical assemblies.

"Announced last year was a ten million volt x-ray machine capable of 1 per cent sensitivity in the radiography of ten inches of steel. The unit used to make this exposure is only 4½ feet wide, 4 feet high, and 2½ feet deep. Exposure time at 6 feet is 30 minutes for 10-inch steel, or 8 times faster than a 2 million volt machine.

"Three 100 million volt x-ray generators have been ordered for installation to be used primarily for experimental and testing purposes.

"A new 250 thousand volt x-ray machine, providing increased penetrating power by use of constant potential, offers simplified controls, and greater operational stability than previously available. For the light metals field, a new 100 KVP wall mounted unit is obtainable, having adequate flexibility plus a new simplified, dustproof control cabinet.

"New designs in x-ray diffraction equipment have been announced and more are expected. Growing interest in this field and in microradiography is indicated by the number of new installations and the increasing number of technical reports and applications.

"Technical knowledge has progressed with the reporting of new data and applications. In general, the 1947 story and 1948 prospects indicate further expansions in the established uses of industrial radiography, rather than anything radically new in applications."

X-Rays Gage Hot Strip Steel During High-Speed Rolling

W. C. Hutchins, manager, special products division, General Electric Company, Schenectady, N. Y.: "Notable for the number and variety of new testing and measuring instruments made available to the metal-working and allied industries, was the year 1947. Among new instruments was the metals comparator, with widely adjustable frequency, for non-destructive testing, of magnetic as well as non-magnetic metals. Another new instrument was the pneumatic fatigue tester for materially speeding up the testing of materials as well as actual metal parts, such as turbine blades.

"The electron diffraction instrument became another new research tool for the metallurgist in the study of metal surfaces, corrosion, and alloying. Similar to the X-ray diffraction unit, this instrument goes only into the surface of the material, having a penetration of 200 or 300 atom diameters.

"Finally, the first X-ray thickness gage for hot strip steel was installed during 1947. This gage indicates thickness of hot strip while rolling at high speed. This technique is now being extended to cold rolled steel."

Recognizes Importance of Basic Government Research

George Sachs, Case Institute of Technology, Cleveland: "I consider one of the most important developments in 1947 to be the realization of the necessity of fundamental research work by the government. The field of engineering is included as one of the major fields. The Navy is spearheading this movement, and the Office of Naval Research has farmed out a large number of contracts devoted to fundamental research in engineering. This development is significant and important in several respects.

"First, the opinion expressed by far-sighted persons that the world is running out of scientific resources in much the same way as it runs out of natural resources is gradually being recognized by wide circles. There is still much opposition to this statement and many engineers of the inventor type feel that we can create industrial achievements out of thin air.

"However, the majority of those who are recognized as industrial leaders feel that the building up of scientific resources is as much a problem as the development of substitutes for natural resources such as crude oil products, natural textiles and rubber.

"Second, engineering in this country has usually not been rated as a science and has not been considered as requiring a scientific foundation. This is particularly true for old engineering fields such as metallurgy, which have been built up on all the experience provided by Europeans in centuries of research work. Now, it becomes increasingly clear that engineering technique can be further developed to yield a higher living stand-

ard only if new scientific facts can be provided as nuclei.

"To those who have grown up in contact with engineering science, the biggest problem to be solved by the Government and, particularly, by the agencies charged with the development of research, is the education of younger engineers in the technique of basic research."

Surface Roughness Measurement By Facsimile Eliminates Dispute

J. Manuele, director headquarters Quality Control department, Westinghous Electric Corp., Pittsburgh: "No adequate means existed up to a decade ago for properly evaluating the roughness of machined or ground surfaces. Hence, notations, such as 'machine all over, grind all over, and grind smooth' were common instructions on engineering design drawings. The problem of interpretation of such notes was a difficult one. The inspector, the machine operator, and the engineer might conceivably, and often did, entertain different views.

"The problem was partly solved with the issuance of the American Standards Association Standards 46.B1, titled Surface Roughness, Waviness, and Lay. This industry standard recommended that surface roughness be indicated in microinch deviations from a reference surface, presumably the nominal or ideal surface. It has been common in the last few years, therefore, to designate surface roughness by a number, which indicated the average deviations of the hills and valleys from this nominal surface. Instrument manufacturers have produced several instruments for measuring these deviations.

"This solved the problem for the design engineer and the inspector, who now can use an instrument for measuring the roughness of the machined or ground surface. However, the average inspector and workmen do not understand thoroughly how the measuring instrument operates and, therefore, there is some skepticism on the part of an inspector, or workman, as to whether two surfaces are alike or not. Use of the microscope or a magnifying glass has been found very satisfactory for comparing two surfaces. The drawback here is the limited area of the surface that can be explored with a microscope.

"A simple device has been developed recently to overcome these objections. This consists of putting a drop of acetone on the surface in question and placing a piece of acetate film over the acetone and applying a slight pressure with the heel of the hand to the acetate film. In a matter of seconds, the acetone causes the acetate film to soften and flow into the most minute serrations in the surface. However, within a half minute or so the acetate film hardens and may be lifted off the surface. An exact replica, or facsimile, of the surface of the material, is thus obtained on the transparent acetate film. This film is mounted in a suitable holder, and projected on a screen at any convenient magnification for study."

Spectrochemical Analysis Now By Direct Intensity Measurement

W. B. Coleman, W. B. Coleman & Co., Philadelphia: "Both inspection and methods of testing have shown considerable advancement during the past year. Electronic methods have been applied in many instances in connection with testing equipment. Non destructive testing has also progressed considerably during the past year, a Society having been formed along this particular line. A resistance strain gage has found wide application in the fields of automotive engineering, in bridges, airplanes, ships, locomotives and machine design in preparing stress strain curves to check loading conditions or stress distribution.

"The electron microscope is now finding its place in industrial research. There have been numerous installations during the past year.

"Supersonic methods of metal inspection, in which sound waves with frequencies above the upper limit of sensitivity of the human ear, are utilized to detect flaws or discontinuities in metals. The detection of flaws in steel by magnetic methods has also shown rapid development in the equipment used.

"While all of the above deal mainly with strength and defects in metal, the analysis technique of metals and alloys has also been improved by electronic methods. For instance, spectrochemical analysis by direct intensity measurement is now possible, eliminating the photographic difficulties that have been encountered.

"While the improvements made this year appear phenomenal we have only scratched the surface of possibilities and the next few years will show even greater development of ideas now in the drawing board stage."

Use of Statistical Methods Grows as Inspection Tool

J. R. Steen, director, quality control, Sylvania Electric Products Inc., Flushing, N. Y.: "Today a great deal of thought is given to the subjects of Inspection and Quality Control, and although at first it might appear that the terms are synonymous, such is far from the actual truth. Inspection, or rather sampling inspection, is very important in controlling quality in a constructive way; that is, by finding and correcting causes of variation rather than by inspecting the completed product and accepting or rejecting items after it is too late to do otherwise.

"At the present time there appear to be two general schools of thought regarding quality control and inspection. The first, which is a holdover from the past, considers the inspection function as the controlling one, and quality control as an aid to and a subdivision of inspection. A great many have arrived at a different decision, however, in that quality control is considered the important overall function, and inspection, either sampling or 100 percent, if required in certain instances, as the means to an end.

"The general thinking of the latter group is that wherever possible costly 100 per cent inspections should be eliminated and responsibility for building quality into a product should be that of the foreman and operators involved, based on the results of sampling inspections made under guidance of the quality control de-

partment. This is a step in the right direction; that is, the substitution of control of quality during manufacture for the sorting of defectives after manufacture.

"One of the important advances in quality control recently is the application of statistical methods. Although these methods were developed as far back as 1924, it is only within the past 6 or 7 years that they began to receive universal acceptance. This was brought about by the war, during which time Government sponsorship of educational courses along statistical quality control lines brought realization to manufacturers of the extra-ordinary benefits to be gained by the utilization of this unusually powerful tool.

"Although statistical methods are no substitute for common sense, their importance as a tool is becoming appreciated more and more daily, since they can and are being applied successfully, not only to the control of quality of a manufactured product, but also to the control of materials which go into the final product, to the control of machines on which the product is made, and to the control of operator irregularities."

Servo-Mechanism with Recorder "Weighs" Mine Cars in Lengths

W. R. Daniels, Streeter-Amet Co., Chicago: "Engineers in the field of weight recording have been continuously confronted with problems of obtaining weights in a manner which is accurate, speedy, and inexpensive. Progress has been made by various individuals along these lines in years gone by; a few of these accomplishments were the recording of weights of moving vehicles, and the weighing of rolling stock at the rate of from four to five railroad freight cars per minute.

"A very recent problem, which we of the industry were called upon to investigate, was that of obtaining the net weight of material handled in mine cars in lengths of one to three cars and the recording of this weight on a card or weigh ticket. In addition to this printed record, we were required to construct a unit which would totalize these net weights over a period of one work day. After a very careful study of this problem, it was decided that the solution lay in the use of a servo mechanism. This type of mechanism used in conjunction with a special recorder will soon satisfy the aforementioned requirements."

Oxygen in Open Hearth Sets Need for Closer Charge Control

Charles R. Funk, chief metallurgist, railway spring division, American Locomotive Co., Latrobe, Pa.: "Main topic of discussion today in steel making is the use of oxygen both as a fuel and a bath decarburizer. Increased tons per hour at considerable savings have been forecasted and oxygen plants are being built to handle both open hearth and blast furnace needs. It seems to the writer that the use of oxygen in the open hearth can very likely require closer control of the furnace charge, closer control of the procedure during the working and refining periods and by all means a thorough testing of the steel made so that the steel users will in no way receive an inferior product.

"It is commonly realized that it is not a steel buyer's market and the steel industry can therefore permit a freer type of investigation or use of oxygen than would normally be the case, but at the same time it is still the steel maker's responsibility to see that quality standards are maintained at the higher levels developed during the past two or three years."

Predicts 2% of Gross Sales To Be Earmarked for Research

C. O. Dohrenwend, Midwest Research Institute, Kansas City, Mo.: "Rapid development of the use of industrial research in the United States is probably the most significant factor influencing our future industrial development. This activity spent well over a billion dollars in 1947. The various universities and technical schools are taking new responsibility in cooperating with industry for applying basic principles of science to industrial problems, and as a result research seems to be taking on a new meaning. Many of the progressive industrial leaders are seeing a need for research in their activities, particularly in social sciences along with the developments in physical sciences. They are finally realizing that the social questions and problems of human relations are as vital to the development and maintenance of the free enterprise system as the development of the more physical things which tend to increase our physical comfort. Both large and small industries are now well on their way to having had sufficient experience for proving the worth of industrial research and will undoubtedly turn more and more to research methods for studying their industrial problems.

"The rapid increase in industrial research will undoubtedly continue until all American industry is expending roughly 2 per cent of their gross sales on some type of research activity. This figure appears proper for giving maximum research benefits. While production and sales are the mainstay of industrial activity, industrial research has shown it can stabilize these activities and has come to play as important a role as engineering in American industry."

Sees Buyers' Market In Very Near Future

Sam Tour, Sam Tour & Co., New York: "While there are many important events and developments which took place in the last year, I feel that the development of the next year will be exceedingly important to this country. An indication of what is to come has been felt in some industries. It will become increasingly apparent to other industries as the weeks and months roll by. What is this future requirement? It is simply the need to change our outlook, our thinking, our psychology from that of the sellers' market to that of the buyers' market.

"The careful business executive is preparing for the inevitable buyers' market. This preparation is taking the form of a detailed study of plant, process and product. The plant and process are being carefully checked for maximum economy of operation. The product is being checked to see if it can be improved in quality and sales appeal.

"The coming decade will see the engineer, the production man and the commercial laboratory combine forces to keep the metalworking industry the barometer of progress."

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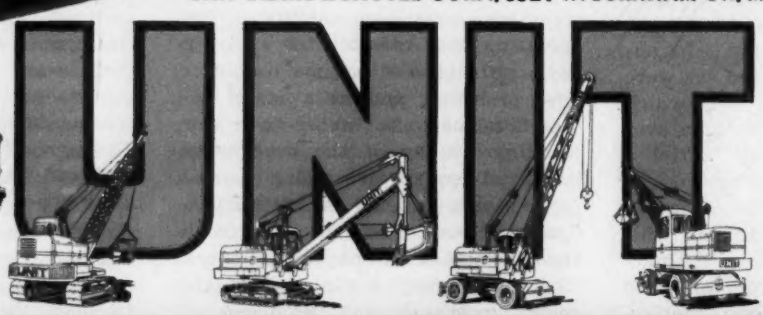

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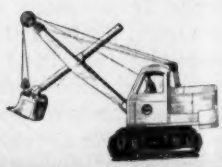

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Equipment

Equipment makers meet mill operators' demands. . . Plants built with "controlled conditions". . . Methods for flame-cutting stainless introduced. . . Axial air-gap motor used in certain machine applications. . . Maintenance problem in smaller plants

Steeple-Type Vertical Worm Gear Reducer Developed

R. C. Ball, president, Philadelphia Gear Works Inc., Philadelphia: "While many different types of speed reducers have been brought out, they are more or less a combination of gears. A new steel type gear speed reducer, developed during 1947, makes it possible to use an agitator paddle without the resulting whip where the conventional type of reducer would not be practical without a step bearing in the bottom of the tank. Filling a long-felt need, the vertical worm gear reducer was especially developed for and has had successful use in, numerous process industries—driving agitators, mixers, circulators and the like."

Mill Operators' Demands Met By Equipment Manufacturers

F. E. Walling, president and general manager, Lewis Foundry & Machine division, Blaw-Knox Co., Pittsburgh: "Quality demands on finished product in both the ferrous and nonferrous metal rolling industries indicate that suppliers of rolling mill equipment must be able to provide facilities equally capable of producing quality and tonnage simultaneously.

"Wide spread of potential physical characteristics of metals in flat rolled products developed by predetermined cold rolling and heat treating practices are an initial responsibility of the rolling mill builder, in that such mills must conform throughout so that the accuracy of their construction is parallel to the accuracy of the product rolled.

"Gage accuracy and surface quality requirements, along with tonnage demands indicated by speed of delivery have necessitated interesting designs on the hot rolling of bar stock for cold heading purposes. There is no question that the mill operators' demands from all phases are being met and advanced in design by the manufacturers of rolls and modern rolling mill equipment today."

Resistance Welding Machines Designed for High Production

G. W. Garman, control division, General Electric Co., Schenectady, N. Y.: "In the field of resistance welding, primary emphasis has been on more efficient utilization of this particular method of metal fabrication through the design of special welding machines and fixtures, particularly for high production rates. Two industries which have found special machines and equipment to be of value are the automotive industry and the home appliance industry. In addition to being designed for high production rates, these machines are so built that there is a continuous flow of material through them, thereby greatly reducing the number of times that the work has to be handled and rehandled.

"Automobile builders turned to a greater extent to the use of electronic control equipment, particularly to reduce maintenance and to increase the production rate. This requirement led to the development of either new or modified forms of electronic control capable of operating portable welding guns at very high welding speeds.

"Attention has continued to be centered on the question of power supply for resistance welders. Experience has shown that most industrial plants have adequate power supply systems, and that the standard 60-cycle, single-phase machines are generally used."

Industrial Plants Built With "Controlled Conditions"

J. K. Gannett, vice president and director of engineering and research, The Austin Co., Cleveland: "Total new industrial plant construction in this country since V-J Day has far exceeded similar expansion in any other peace-time period. During this period welding has made an important contribution as is exemplified in its expanding use in welded structures, piping installations and conveyors, cranes, manufacturing equipment, and mechanical and electrical installations.

"All parts of the country have shared in this huge expansion program. But the definite trend is to locate these new plants away from the large cities on relatively inexpensive land suitable for the construction of one-story buildings with provision for unlimited expansion. For example, it is not uncommon for a manufacturer to acquire a site having an area of from 100 to more than 1500 acres.

"These sites have been carefully selected by capable plant location engineers. They have carefully weighed freight rates, cost of power and fuel, accessibility of markets and other factors affecting the cost of manufactured products.

"On these sites, manufacturers are having constructed mostly one-story buildings, utilizing long span welded trusses spanning from 60 to 100 feet in order to obtain maximum flexibility in manufacturing operations. Furthermore, these new plants are often of the controlled conditions. type in which are incorporated air conditioning, acoustical treatment, high intensity fluorescent lighting, all of which use metal products. Along with these we find the widespread

use of metal decks, the increasing tendency to use insulated metal wall panels, some of which have real architectural merit, and the higher mechanization of plants with increasingly wide use of conveyors, cranes, and similar equipment."

New Metallizing Unit Makes Many Spraying Speeds Possible

L. E. Kunkler, president, Metallizing Co. of America, Chicago: "In the metallizing industry one outstanding development is the new electric-powered metallizing gun which has increased efficiency and eliminated the use of compressed air as a power source. This new gun, called the Mogulectric, is the answer to production line spraying or other types of spraying where top speeds are essential and service is a must. By using different combinations of gearing almost any spraying speeds can be obtained so as to spray at top efficiency any of the metals used in the metallizing industry. Through the use of an electric drive, air requirements are materially reduced and turbine adjustments are eliminated."

Equipment for Flame Cutting Stainless Steel Introduced

G. E. Bellew, steel mill specialist, Air Reduction Sales Co., New York: "In recent months the flux-injection method of flame cutting stainless steels has been put to a wide range of new uses. While some of these were important in extending scope of the process as to thickness and cutting factors, the most important feature of this widening use has been the establishment of the method as a routine, accepted standard procedure.

"Two newsworthy developments in the process during the year were the introduction of hand equipment suitable for this type of work, and the adaptation of the process to extremely heavy thicknesses—in the range of 30 inches and up, or about as heavy as is usually encountered in stainless work. These very heavy sections included ingots sliced for metallurgical purposes, ingots cropped and cut to size, and heavy material cut to handling size as scrap.

"Developments now under way—in the laboratory and in testing—are expected to further increase the versatility of the process even while its basic use is still becoming more widespread."

Welding Control Manufacturers Offer New Safety Equipment

C. B. Stadum, manager, resistance welding engineering, control division, Westinghouse Electric Corp., Buffalo: "Safety of personnel has always been the concern of users and manufacturers of resistance welding equipment but this year great strides have been made to turn this concern to an actuality. In order to prevent industrial accidents, the welding control manufacturers are now offering equipment that makes it virtually impossible for unauthorized persons to become exposed to dangerous voltages. This has been done by providing in the controls means by which power is disconnected whenever the door of the control equipment is opened.

"These means include circuit breakers, contactors or safety switches. Not only is safety of personnel provided but other advantages such as stopping of 'run-away' equipment, remote control tripping, and circuit protection can be obtained by use of various protective equipment."

Axial Air Gap Motor Used in Certain Machine Applications

H. A. Bamford, manager, electrical division, Fairbanks, Morse & Co., Chicago: "There has long been a demand in the field of machine design for a motor of improved appearance which would blend with the contour of the driven member—a motor which, although considerably smaller and lighter in weight than the conventional type of machine, would retain all the necessary requirements of sturdiness, power and performance. The new axial air gap motor is the carefully planned answer to that demand.

"This motor is distinguished from the conventional type of motor by the fact that the air gap dimension is measured parallel to the axis of the shaft, as compared to a radial dimension in the conventional machine. It is from this contrasting feature that the motor derives its name.

"Although the new unit embodies many advantageous innovations, it is not intended to supersede or replace the conventional type of motor. There are definite applications for the axial air gap motor, and it is for these that its use is recommended."

Special Resistance Welding Machines More Widely Used

F. R. Hensel, vice president in charge of engineering, P. R. Mallory & Co. Inc., Indianapolis: "Trend to special resistance welding machines evident in past year was even more pronounced during 194 Substantial increases in the cost of labor and material have necessitated improved and more economical fabricating techniques in the durable goods industry, particularly in those lines facing ever increasing competition.

"In such industries as the automotive, refrigeration, electrical and gas appliances, use of special multiple spot welding machines which are especially tooled for specific applications, are being used to produce hundreds of welds in a period of time heretofore required to make a few welds using standard welding equipment. Use of high speed, dial feed spot and projection welding machines increased during the year and interest in the series type dial machine (which makes two welds with one stroke of the welder) is on the increase.

"In many localities, the resistance welding process has outstripped existing power facilities and resistance welder manufacturers have brought out an increasing number

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improvements to remedy the high kilovolt-ampere demand at low power factor common to the conventional single phase alternating current welders.

"Principle of these low demand welders is the 'three phase,' more commonly called 'low frequency' welder, which draws power from a three phase supply and uses a three phase welding transformer, the interconnection being made through ignitron tubes connected for half wave rectification.

"A stored energy type of resistance welder which utilizes heavy duty water-cooled storage batteries for the source of welding current is meeting wide-spread use in locations where the power facilities are entirely inadequate. Capacitor correction of the low power factor demand of alternating current single phase welders is being employed more frequently on new installations."

Recruiting Maintenance Men Problem in Smaller Plants

J. C. Hanna, vice president and chief engineer, Hanna Engineering Works, Chicago: "Can maintenance men be expected to keep up with what's new and coming in machine design and processing equipment? Some of the best engineers in the country devote full time to maintenance. They have developed comprehensive organizations capable of handling advanced problems in electrical, mechanical, civil, and chemical engineering; also in chemistry. Such organizations are found only in large corporations.

"What of the maintenance men in medium-size and small plants? Individually such men are expected frequently to deal with all the applied sciences just mentioned. That they have done so well, to date, with electronics, complex electro, hydro and pneumatic circuits, etc., is worthy of wonder and admiration.

"We now speak glibly of servomechanisms, high cycle induction heating, chemical-polishing, hydraulic eddies causing cavitation, etc., but 5 years ago most design engineers understood each of these to be a realm of the "starry-eyed" specializing post graduate in the research lab. We now just as glibly drop devices involving these considerations into the basket of the maintenance man to take care of and then learn from him things we had not yet found out about them. Design progress must continue apace, but we must give thought to the maintenance man's myriad problems; thought as to where our future maintenance men are to be recruited."

Progress in Electrical Equipment Continues

Ernest E. George, engineer, metallurgy division, chemical department, General Electric Co., Pittsfield, Mass.: "A new standard line of Alnico permanent magnet holding assemblies which combine minimum space requirements with maximum holding power was designed to effect economy and efficiency by eliminating the necessity for making each new assembly application to particular specifications. The new line consists of five types in 17 sizes ranging from a pull of one and one-half to 500 pounds.

"The ion trap was designed to eliminate the ion spot of the 10-inch direct view television picture tube. Two ductile permanent magnet rings (cunife) are magnetized parallel to their diameter, with polarities opposite each other. When mounted in the correct position on the picture tube, the field set up by these magnets causes the electron stream to be deflected in such a manner as to separate any ions present from the electrons. This action is possible due to the large mass differential between the ion and the electron. The deflected electrons rapidly return to their original course, while the massive ions do not return in time to strike the tube screen.

"Magnetic vibrator assembly has been designed to test Alnico loud speaker magnets more accurately in a shorter time.

"The magnetic vibrator assembly consists of a synchronous motor which vibrates a coil in an equivalent loudspeaker magnetic circuit, whose circuit is designed to operate at the maximum energy point of the demagnetization curve. The coil vibrating in the magnetic field set-up by the speaker magnet, cuts lines of flux at a constant rate. A voltage is induced in the coil and read on a voltmeter. The reading on the voltmeter is an indication of the total number of lines of flux in the air.

"Alnico magnets with iron backing were successfully pressed and sintered. The soft iron backing provides a high permeability return path without the necessity for grinding the magnet and cementing a separate iron back to it. Making the back an integral part of the magnet assures a zero air gap. The sintered shrinkage of the component layers of different materials is carefully controlled in order to have a perfect bond between the two layers.

"A method for sintering cunife at a temperature about 100° higher than the melting point of copper was developed. As Cunife contains 60 per cent copper, it is interesting to note that the compressed powders do not melt but retain the shape originally pressed when propertly sintered."

Uses of Flexible Metal Tubing Become More Varied

S. H. Collom Jr., vice president, Pennsylvania Flexible Metallic Tubing Co., Philadelphia: "Uses of flexible metallic hose and tubing in industry are becoming more varied and unusual; many more new applications will be developed in the future. It is a fact that the high flexibility and safe, leak-proof service provided by this tubing helps solve numerous problems on transmitting most liquids, gases and light solids. But added to these many uses are the unusual applications to which flexible tubing is highly adaptable.

"For example, one radio vacuum tube manufacturer used Penflexweld flexible tubing as a 3500-volt conductor on newly-developed induction heat 'bombarders' that create the vacuum in radio tubes. Water is passed through the tubing to keep it cool, while it flexes easily with the motion of the machines. In another case, a power company laid electric power cables under the Delaware

iver, and encountered a problem of ooling the cables where they emrged at the river banks. Flexible ooling jackets, tailor-made by Penex, encase these cables ends, thus eeping them cool and protected."

Welding Performance Improved by New Equipment

C. I. MacGuffie, manager sales, elding equipment divisions, General lectric Co., Schenectady, N. Y.: "The ear 1947 saw the electric arc welding industry continue its consistently steady, healthy progress. Improvements in both alternating current and direct current welders, resulting in easier operation, improved welding char-

cteristics, and, in some cases, pronounced reduction in the size and eight of the equipment, materially ontributed to this progress.

"In addition, developments in inert-rc welding equipment broadened the se of this process for welding aluminum, magnesium, and beryllium opper, as well as a wide range of ther metals and alloys.

"New electrodes also played an imortant part in the progress of the lectric arc welding industry during he year. Also noted was a subtantial increase in the number of achine welding applications."

Machine Tool Advancements Attributed to Controls

D. W. McGill, manager machinery lectrification, Westinghouse Electric orp., East Pittsburgh, Pa.: "In the ast decade, the percentage of the selling price of a machine tool representing electrical equipment has practically doubled. This can be attributed to the use of carbide tools — requiring greater horsepower — and the trend oward more fully automatic machines to lower unit machining costs.

Anyone who visited the Machine Tool Show in Chicago saw this trend toward more fully electrified machines.

"Analyzing the situation further, it is obvious that the advancements that have been made in the functioning of machine tools can be directly attributed to control. Motors today perform the same functions as they did years ago but the means of controlling them have improved considerably. New electronic devices are other tools in the hands of the machine tool engineer to better and more accurately control the functions required of the machines.

"Further evidence of the value of control devices are the ingenious and complex assemblies made by the machine tool builders themselves which give each manufacturer's machine a distinctive personalty."

Use for Precision Cast Super Alloys To Increase in 1948

W. O. Sweeny, Haynes Stellite Co., Kokomo, Ind.: "During 1947, there was a definite trend toward more extensive use of precision cast cobalt base high-temperature alloys, frequently referred to as superalloys, for gas turbine and other applications where high stresses at elevated temperatures are encountered. Principal applications of these cast materials have been the gas turbine blades, nozzle vanes and partitions.

"Gas turbine units for turbo jet engines which are actually in production, are depending more and more on precision castings for this service because this process permits the use of better alloys, is ideally suited for large quantity production and competes favorably and economically with forged or machined airfoil shapes. Also, the units still in the experimental stage are either using exclusively, or testing extensively, one or more of these superalloys in precision cast parts.

"An indication of the extent to which both the precision casting process and the superalloys are accepted in general use for high-temperature service is shown by the Society of Automotive Engineers publishing Aeronautical Material Specifications covering the various superalloys and also those grades of stainless steels which are precision cast for use in aircraft or gas turbine work.

"Considerable research was conducted in 1947 both on government sponsored projects and in private laboratories on improved cast high-temperature alloys, but no new ones have yet been made commercially available.

"We predict that 1948 will show a marked increase in the use of precision cast superalloys and as the demand for materials that will stand higher temperatures and greater stresses continues to grow, that some of the better cast alloys, now in the laboratory stage, will begin to be commercially produced."

Qualified Mechanics Seen As Great Industrial Need

Walter J. Brooking, dean, LeTourneau Technical Institute, Longview, Texas: "One of industry's greatest needs today is qualified mechanics with enough technical education to lead and direct the efforts of their fellow workers in the battle lines of efficient industrial production. All industries spend time and money training and educating members of their own staffs. The part time worker who attends a junior or senior college or technical school the other part of the time on a co-operative educational plan; or the full time employee who does some part time study parallel to his work gets the best balanced and most useful kind of education for American industrial leadership.

"The modern industrial production leader must have shop experience and production 'know-how'; and should also have the equivalent of a college education in the use of languages, understanding of people and industrial problems, and the science of his own industry's materials and production. Many colleges, junior colleges, universities and technical schools are interested in part time co-operative student employee programs.

"American industry must have trained leaders available for any crisis. Let's not overlook the advan-

tages of co-operative work-study programs with school and industry. These student-employees learn the industry or trade from the bottom up. The participating company can evaluate him as a producer and help shape him into a potential leader while he is tailoring his formal education to apply most pointedly to the company's business and problems."

New Electrical Equipment for Sheet and Tinplate Mills

G. E. Stoltz, manager, metal working section, industry engineering, Westinghouse Electric Corp., East Pittsburgh, Pa.: "Following the end of the war, many of the steel companies were quick to place orders with manufacturers to increase their facilities for peacetime production. Some of this new equipment is now in operation, other equipment is just being installed and some is still in the process of manufacture.

"A major portion of this new electrical equipment is for mills that produce sheet and tinplate. There is one large continuous hot mill being installed, a number of new cold reduction and temper pass mills, as well as the replacement of old motor equipment with new to speed up existing mills. With this, are a number of processing lines to match the increased tonnage of the new cold reduction mills. Practically every type of mill will be found in this program although other prominent units adding to the increased tonnage are rod and tube mills.

"Application is noted of an 8000 hp (2—4000 horsepower) twin motors to a 46-inch resversing blooming mill. Most of the twin motor drive reversing blooming or slabbing mill installations are for large slabs. We feel the performance of these twin motor drives justifies their use on smaller blooming mills. While a 46 inch blooming mill is not a small mill, it indicates this trend.

"A number of rod mills are now under construction using individual direct-current driving motors equipped with control to minimize transient speed drop as the metal enters the roll stand. Without this type of control, a direct current motor will instantly have an appreciable drop in speed until it is able to increase its armature current to produce the added torque required. This tends to throw a loop in the rod being entered and may stretch those already in the mill. One mill is in operation with this type of control and flywheel effect and the instantaneous change in speed has no noticeable effect on the cross section of the metal.

"A four-stand tandem sheet mill was placed in operation January, 1947 having a maximum speed of 3000 feet per minute. It has been found that the lighter products can be rolled at this maximum speed quite satisfactorily, and indicates the possibility of going still higher on future sheet mills."

Reversing Hot Strip Mill Has Unusual Feature

H. W. Poole, engineer, steel mill division, General Electric Co., Schenectady, N. Y.: "In keeping with the past trend, the steel industry continues to emphasize the need for more automatic equipment, higher speeds, and a greater output per mill or processing line in order to combat rising costs and to compete in today's markets. As always, the electrical industry has played a major roll in this effort.

"One of the largest a-c mill motors ever built by the General Electric Co. (rated 4000 horsepower, 78.3 revolutions per minute) will go into operation soon to drive an intermediate roughing stand on an existing semi-continuous hot strip mill.

"A new 66-inch reversing hot-strip mill is being built for installation in the Pittsburgh area. The unusual feature of this mill is that strip is rolled flat by passing it back and forth through the rolls until the thickness is reduced to about 3/4-inch, and then the strip issuing from the mill is directed into a coiler built into a furnace above the mill table. On the next pass, strip issues from the coiler, runs through the mill in the other direction, and is directed into a similar coiler on the other side. These coilers enable the strip to retain its heat so that it may be rolled in the reversing mill, without reheating, down to thicknesses such as usually are produced on tandem mills.

"A new 54-inch 4-stand sheet mill is being built for installation in the Chicago area. Individual generators are being used for the main stand motors as well as for the uncoiler and winding reel. A 24-inch four-high reversing cold strip mill will be installed in the New England area for rolling alloy steels. A Sendzimir cluster-type reversing 25-inch mill will be installed for the production rolling of stainless steel.

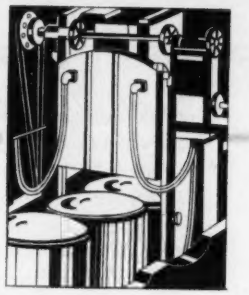
"Processing lines have continued to represent a major portion of the modernization and expansion program in the sheet and strip finishing industry. Numerous new developments have taken place and many more are in the design stage. Adjustable voltage control is now being used almost exclusively for strip processing lines.

"Several pull-through type pickling lines are being furnished with electronic control of the winding reel which propels the strip through the pickling tanks. Electronic control automatically maintains a constant, preset strip speed as the coil diameter increases."

"Underbead Cracking" Eliminated By Lime-Ferritic Electrodes

J. H. Deppeler, chief engineer, Metal & Thermit Corp., New York: "In electric arc welding the end of the war left most of the electrode manufacturers floundering due to the use of large inventories disposed of by the various wartime industries. There is, however, one outstanding development and that is in the manufacture and use of the electrodes probably to be known as E-6015 and E-6016.

"These electrodes are also known as the lime ferritic type and their principal advantage is found in the elimination of 'underbead cracking' when used on steels of the higher tensile strength and the higher alloy type. These electrodes are also useful in the welding of the free machining steels with their higher sulphur contents."

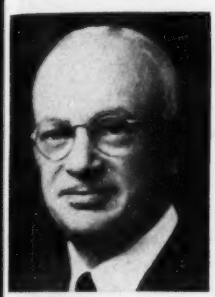


Heat Treating

Convection heating reduces annealing period. . . "Mass-production" treating boosted by automatic conveying. . . Scope of electric heat treatment broadened. . . Wider use of induction heating for forging predicted

Induction Heating and Melting Out of "Special Jobs" Category

R. N. Blakeslee, vice president, Ajax Electrothermic Corp., Trenton, N. J.: "Chosen as the most economical heating method in the manufacture of such plebian, low-cost products as pick-axes, bolts, and malleable iron, induction heating and melting has progressed far out of the 'special jobs' category during the past few months. Here are a few specific examples of this down-to-earth movement:



"Most outstanding new induction heating installations in the forging field are the forging of automobile crankshafts, differential housings, and small tools such as picks and sledges. In one such installation, this method is teamed up with old forging presses to give a remarkable overall forge-shop efficiency. In another forging operation, large bars are heated in ordinary furnaces, and induction heaters are used only for bringing the bars back up to forging temperature after forging the tongs grip —a neat solution to a knotty forging problem. New applications of induction heating for dies and die nozzles are also on the horizon.

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"By the use of 15 horsepower motor drives on the base fans and by adopting means of heating the gases by convection and in transferring this heat by circulating these gases between the coils, the progress of heat is vastly increased for penetration throughout the coil, and the soaking times are abolished or limited.

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"The salt bath and the automatic conveyor has offered a satisfactory means to carry out these operations. In addition, the availability of proper salt baths, and the advantages they offer, increased the use of Marquenching and Austempering processes. Both of these operations depend upon a suitable quenching medium 350°-950°F, and the salt baths have met these requirements adequately and safely.

"The last two methods have estab-

tages of co-operative work-study programs with school and industry. These student-employees learn the industry or trade from the bottom up. The participating company can evaluate him as a producer and help shape him into a potential leader while he is tailoring his formal education to apply most pointedly to the company's business and problems."

New Electrical Equipment for Sheet and Tinplate Mills

G. E. Stoltz, manager, metal working section, industry engineering, Westinghouse Electric Corp., East Pittsburgh, Pa.: "Following the end of the war, many of the steel companies were quick to place orders with manufacturers to increase their facilities for peacetime production. Some of this new equipment is now in operation, other equipment is just being installed and some is still in the process of manufacture.

"A major portion of this new electrical equipment is for mills that produce sheet and tinplate. There is one large continuous hot mill being installed, a number of new cold reduction and temper pass mills, as well as the replacement of old motor equipment with new to speed up existing mills. With this, are a number of processing lines to match the increased tonnage of the new cold reduction mills. Practically every type of mill will be found in this program although other prominent units adding to the increased tonnage are rod and tube mills.

"Application is noted of an 8000 hp (2—4000 horsepower) twin motors to a 46-inch resversing blooming mill. Most of the twin motor drive reversing blooming or slabbing mill installations are for large slabs. We feel the performance of these twin motor drives justifies their use on smaller blooming mills. While a 46 inch blooming mill is not a small mill, it indicates this trend.

"A number of rod mills are now under construction using individual direct-current driving motors equipped with control to minimize transient speed drop as the metal enters the roll stand. Without this type of control, a direct current motor will instantly have an appreciable drop in speed until it is able to increase its armature current to produce the added torque required. This tends to throw a loop in the rod being entered and may stretch those already in the mill. One mill is in operation with this type of control and flywheel effect and the instantaneous change in speed has no noticeable effect on the cross section of the metal.

"A four-stand tandem sheet mill was placed in operation January, 1947 having a maximum speed of 3000 feet per minute. It has been found that the lighter products can be rolled at this maximum speed quite satisfactorily, and indicates the possibility of going still higher on future sheet mills."

Reversing Hot Strip Mill Has Unusual Feature

H. W. Poole, engineer, steel mill division, General Electric Co., Schenectady, N. Y.: "In keeping with the past trend, the steel industry continues to emphasize the need for more automatic equipment, higher speeds, and a greater output per mill or processing line in order to combat rising costs and to compete in today's markets. As always, the electrical industry has played a major roll in this effort.

"One of the largest a-c mill motors ever built by the General Electric Co. (rated 4000 horsepower, 78.3 revolutions per minute) will go into operation soon to drive an intermediate roughing stand on an existing semi-continuous hot strip mill.

"A new 66-inch reversing hot-strip mill is being built for installation in the Pittsburgh area. The unusual feature of this mill is that strip is rolled flat by passing it back and forth through the rolls until the thickness is reduced to about 3/4-inch, and then the strip issuing from the mill is directed into a coiler built into a furnace above the mill table. On the next pass, strip issues from the coiler, runs through the mill in the other direction, and is directed into a similar coiler on the other side. These coilers enable the strip to retain its heat so that it may be rolled in the reversing mill, without reheating, down to thicknesses such as usually are produced on tandem mills.

"A new 54-inch 4-stand sheet mill is being built for installation in the Chicago area. Individual generators are being used for the main stand motors as well as for the uncoiler and winding reel. A 24-inch four-high reversing cold strip mill will be installed in the New England area for rolling alloy steels. A Sendzimir cluster-type reversing 25-inch mill will be installed for the production rolling of stainless steel.

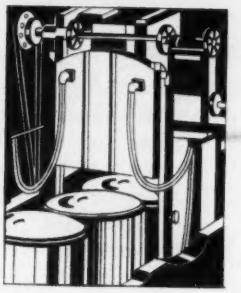
"Processing lines have continued to represent a major portion of the modernization and expansion program in the sheet and strip finishing industry. Numerous new developments have taken place and many more are in the design stage. Adjustable voltage control is now being used almost exclusively for strip processing lines.

"Several pull-through type pickling lines are being furnished with electronic control of the winding reel which propels the strip through the pickling tanks. Electronic control automatically maintains a constant, preset strip speed as the coil diameter increases."

"Underbead Cracking" Eliminated By Lime-Ferritic Electrodes

J. H. Deppeler, chief engineer, Metal & Thermit Corp., New York: "In electric arc welding the end of the war left most of the electrode manufacturers floundering due to the use of large inventories disposed of by the various wartime industries. There is, however, one outstanding development and that is in the manufacture and use of the electrodes probably to be known as E-6015 and E-6016.

"These electrodes are also known as the lime ferritic type and their principal advantage is found in the elimination of 'underbead cracking' when used on steels of the higher tensile strength and the higher alloy type. These electrodes are also useful in the welding of the free machining steels with their higher sulphur contents."

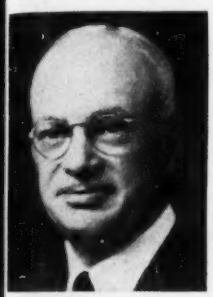


Heat Treating

Convection heating reduces annealing period. . . "Mass-production" treating boosted by automatic conveying. . . Scope of electric heat treatment broadened. . . Wider use of induction heating for forging predicted

Induction Heating and Melting Out of "Special Jobs" Category

R. N. Blakeslee, vice president, Ajax Electrothermic Corp., Trenton, N. J.: "Chosen as the most economical heating method in the manufacture of such plebian, low-cost products as pick-axes, bolts, and malleable iron, induction heating and melting has progressed far out of the 'special jobs' category during the past few months. Here are a few specific examples of this down-to-earth movement:



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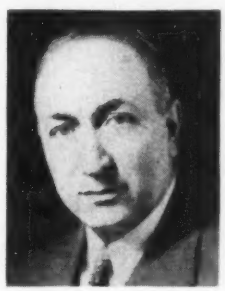

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lished themselves in industry as a dependable means of heat treating production parts with less distortion and better physical properties. Furthermore, utilizing the automatic conveyor equipment, these techniques are applied with decided savings in time and labor. Hence, the immediate future will see more of heat treating of metals carried out, making use of the Marquenching and Austempering methods, along with salt baths and automatic conveyor equipment."

Salt Bath Furnace Installed To Anneal Gear Blanks

R. H. McCarroll, chief engineer, Ford Motor Co., Dearborn, Mich.: "A large salt bath furnace installation to anneal gear blanks and other forged parts preparatory to machining is being made by Ford Motor Co. This method takes advantage of the short time required to fully anneal such parts when the transformation is carried out at constant temperatures."

Hardenability Practical Aid In Productive Heat Treating

A. Neudoerffer, SKF Industries Inc., Philadelphia: "Recent work on 'hardenability' has been quite interesting and of considerable value to the field of heat treating. Up to the present, 'hardenability' has been more or less confined to the laboratory stage, but recent work indicates that probably in a few years it will be used effectively and practically as a great aid in productive heat treating.

"Another very noteworthy trend, which should prove quite useful in heat treating is the radiant type gas burners for rapid and selective heat treatment. This method in conjunction with induction heat treating, which is finding new applications each year, are both going to become, I believe, of increasing importance to the heat treater or metallurgist, in the next few years."

Prepared Gas Atmospheres Widely Used in Heat Treating

T. A. Frischman, chief metallurgist, axle division, Eaton Mfg. Co., Cleveland: "Prepared gas atmospheres for heat treating applications such as bright annealing, clean hardening, carbon-restoration, gas carburizing or furnace brazing are being more widely used than ever before. Benefits from their use far outweigh the costs of gas preparation and the time spent in controlling the processes. Some of the many advantages resulting from the use of these protective gases are prevention of scale, replenishment of depleted carbon in the surface of products, carrier gases for carburizing, prevention of decarburizing reaction, saving in time and higher quality work accompanied by the elimination of some operations.

"Basic researches on the different types of prepared atmospheres are constantly opening up new applications while at the same time additional information is being obtained on how to improve the present handling and use of these gases."

Suspended Carburization Now Standard Procedure

S. L. Widrig, chief metallurgical engineer, Spicer Mfg. Division of Dana Corp., Toledo, O.: "Suspended carburization should be of interest to the present day dollar-conscious metallurgist. This method has passed the experimental stage and is now regular standard procedure.

"Most plants are operating on 5-day week schedule so that it becomes necessary to stop production on a Friday night or Saturday morning. Where large continuous type gas carburizing furnaces are used, it is unnecessary to unload the work from the furnaces in order to shut down, as was previously done, and consequently the furnaces are loaded, at temperature and ready to go on Monday morning.

"Heat treat production now can easily be balanced with the work on the machine lines, and it is no longer necessary to carry a bank of material to allow for the time previously lost in getting production from the furnaces on Monday. The carburizing furnaces become quite similar to any other production machine wherein you press the button on Friday night and production ceases, press the button again on Monday morning and production starts.

"Naturally, technical control of the furnaces over the shutdown period is necessary, carburization of the work in the furnaces must be definitely suspended, this being accomplished by control of the atmosphere and temperature. By eliminating the 8 to 20-hour periods formerly used for loading or unloading and by keeping production balanced with the rest of the plant, the savings in labor and production are obvious."

Large Welded Structures Are Low-Temperature Stress Relieved

T. W. Greene, engineer, The Linde Air Products Co., New York: "Since the field introduction last year of a new practical method of stress relieving of welds known as controlled low-temperature stress relieving, some outstanding and noteworthy applications of the process have been made on large welded structures. As an example, approximately eight of the largest shipbuilding and dry dock yards on the East and Gulf coasts have used the process in reconditioning 50-odd large ocean T-2 tankers.

"The process, which involves progressive, controlled heating to only 350° F, is designed to be and has proved to be practically as effective in reducing residual welding stresses as furnace stress relieving (heating of the entire welded structure to 1100 to 1200° F). Low-temperature stress

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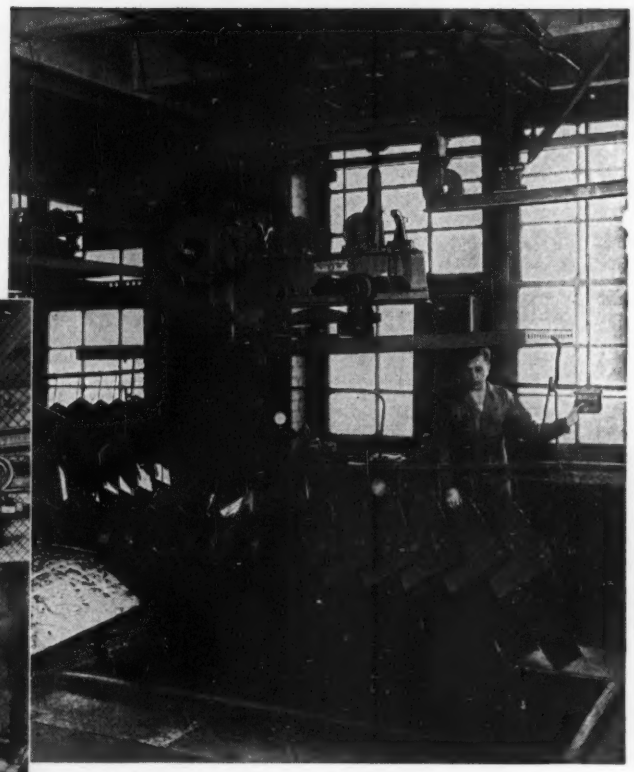

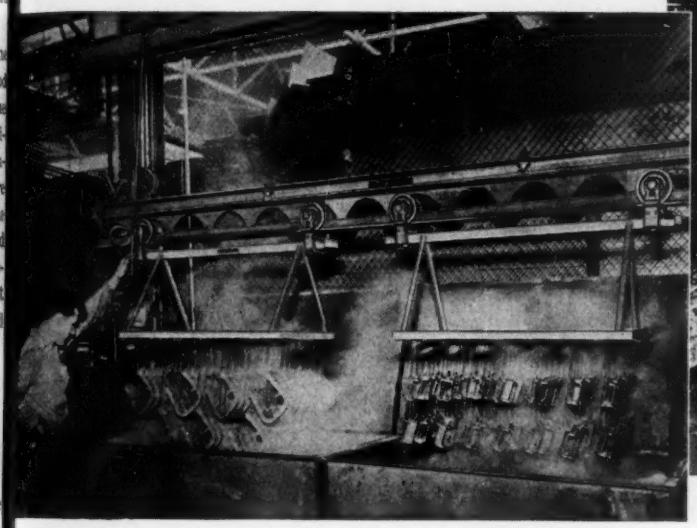

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relieving is intended for use on very large welded structures such as ships, large storage tanks, and general field construction where it is obviously impossible to use furnaces."

Application of Salt Baths To Steel Treating Increased

C. R. Foreman, metallurgist, Park Chemical Co., Detroit: "Two new developments are increasing the application of salt baths to the isothermal heat treatment of steel. The first of these is an improved process for maintaining the neutrality of austenitizing baths. The second is a simple device for removing high heat salt carry-over from low temperature isothermal quenching baths

"The Neutra-gas process maintains neutrality in austenitizing baths at temperatures of 1400° to 2000° F. A gas is introduced into the molten salt in order to reduce or eliminate deleterious products of breakdown or contamination.

"A recently developed filtering device removes austenitizing salts from isothermal quenching baths. The salt is pumped through a filter by means of compressed air. Provision for drying the compressed air is contained in the assembly.

"Both the Neutra-gas process and the filtering device are simple and inexpensive to operate. They are practical methods for use in large conveyorized furnace setups since they remove the necessity for awkward and time-consuming sludging operations. Nevertheless they are also practical for small batch type furnaces."

Wrought High-Temperature Alloys Find Many Uses in Heat Treating

E. V. Ivanso, Steel Sales Corp., Chicago: "During the last year or so, wrought high-temperature alloys, such as Inconel and heat-resistant stainless steels, have found increasingly more numerous applications in the heat-treating field. Where formerly cast alloys were used almost entirely, it was found that in many applications welded or formed structures of the proper wrought alloys provided longer life, lighter unit weights, greater pay-loads and more efficient operation.

"This is usually due to the greater flexibility in design possible with wrought materials, and because the inherently stronger and sounder structure of the wrought metal permits lighter sections to be used. Of course there are numerous applications where a cast structure is the most economical and practical form, and in time use of the two forms of heat-resistant materials will find its own level based on the merits of each. When using wrought materials, design is an important factor, and capable fabricators with good knowledge of the field are vital."

Electric Heat Treating Units Make Gains During Past Year

R. M. Cherry, industrial heating division, General Electric Co., Schenectady, N. Y.: "Application of electric furnace brazing as a low-cost method of fabrication continued its advance during 1947. Larger and larger assemblies were brazed, a typical one of which was the large plate-type evaporator for industrial refrigeration. This assembly consists of two steel sheets in sizes up to 2½-feet wide by 12 feet long. One sheet is flat, the other embossed, to form the ducts. Furnace used was an electric roller hearth unit with preheating chamber, high-heat chamber for brazing, and a water-jacketed cooling chamber, with a total over-all length of 185 feet.

"Another development of interest was the use of large continuous furnaces for annealing bright steel strip prior to coating. One such installation was for annealing heavy gage strip in widths up to 54 inches at a production rate of 20,000 pounds per hour. Furnace used is the roller-hearth type, consisting of an induction section followed by a conventional electrically-heated chamber for equalizing and holding temperature, and a regulated cooling chamber. Power to the induction coils was supplied by 9600-cycle motor-generator sets.

"Additional installations of continuous strip annealing furnaces are now in progress in instances where the strip is of light gage and tower-type furnaces are used. These are heated by the conventional metallic resistor heating units.

"Another important development during 1947 was the application of 9600-cycle motor-generator type equipment to the induction heating of electrolytic tin plate for flow brightening. This provides a method of heating applicable to the higher speeds being considered today, and one of lower first cost and lower operating cost."

Future Possibilities Seen for "Homogenous Carburization"

E. G. de Coriolis, director of research, Surface Combustion Corp., Toledo, O.: "While several significant developments have attained a practical status during 1947, possibly the most important from the standpoint of future possibilities is the process which has been termed homogeneous carburization. By this process the carbon content of strip steel may be increased and almost simultaneously diffused and equalized throughout the material following fabrication into desired form. Low carbon steel stock may, therefore, be used initially, eliminating the need for any lengthy spheroidizing or annealing cycles as required for steels of higher carbon content prior to and during forming operations.

"Die or forming tool life is thereby increased and scrap reduced. It is expected that this process will find rapid acceptance during 1948 for such parts as springs, clips, clamps, flexible disks, etc.; in fact, virtually any part made from strip stock where a springlike action for the piece is desired. Thicknesses up to approximately 0.10-inch may be treated effectively within economical time limits.

"As expected, increased use of atmospheres for various heating and heat-treating operations took place during the past year, and further applications are already indicated for 1948. Nitrogenous atmospheres (NX gas) are being more extensively applied to annealing and similar operations in both steel manufacture and processing. Atmosphere handling of steel prior to galvanizing and enamel-

A

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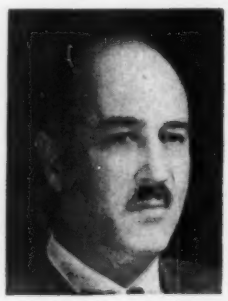
ing has also progressed favorably.

"During 1947 the development of a new automatic atmosphere selector for use with dew point recorders simplified and reduced the cost of recorder applications by making it possible for a single recorder automatically to check and record, at fixed time intervals, the dew points of atmospheres produced by as many as six generators."

Flame Hardening Increases Endurance Limits of Metals

H. V. Inskeep, development engineer, The Linde Air Products Co., New York: "Flame-strengthening is the term given to the use of the flame-hardening process to increase the endurance limits in fatigue of fillets and notches in machine components. The process, in addition to increasing the hardness and thereby the endurance limit of the surface of the part, produces a case with residual compressive stresses.



"These compression residuals further increase the fatigue life of the metal surface. Fatigue life tests, of the rotating beam type, have demonstrated that flame-strengthening may result in the complete elimination of notches and fillets as originators of fatigue failures."

Refinements Continued in Furnace Atmosphere Controls

Willard Roth, engineer, industrial heating division, Westinghouse Electric Corp., Meadville, Pa.: "Last year saw a continuation of refinement in furnace atmosphere controls, and greater emphasis on continuous automatic handling in furnace processes. An example of the former is in atmospheres for the heat treatment of high speed tool steels, both tungsten and molybdenum types. Such atmospheres had been in use for a number of years, but some difficulty was experienced in maintaining the balance between carburizing and decarburizing conditions. The solution in our case involves Endogas with constant dew point and metered hydrocarbon additions. It permits 8-hour day operation of tool room furnaces with complete overnight shutdown of the equipment.

"General use of continuous automatic furnaces wherever possible is logical from the standpoint of handling cost and quality control. However, there is a corollary benefit, namely, better working conditions for the operators. It is a factor which is now receiving primary consideration in planning heat treating layouts. It also illustrates the fact that the continuous furnace is in a class with the automatic machine tool, both from the standpoint of precision and from the personnel standpoint."

Important Strides Made in Induction Heating Practices

T. H. Gray, research engineer, Westinghouse Research Laboratories, East Pittsburgh, Pa.: "During the past year important strides have been made in further applications of induction heating practices, not only to steels but also to cast irons. A commercial installation of a 200 kilowatt radio-frequency oscillator for contour-hardening fine-pitched gears was completed during the past year after a preliminary series of investigations on treating cycles and after an exhaustive series of dynamometer and field tests had been brought to a successful conclusion.

"A better delineation of the respective fields of application of induction heating frequencies between motor-generator frequencies and higher radio frequencies in the field of gear hardening is now available. However, the present concepts are subject to change upon development of higher powered radio-frequency oscillators.

"Induction heating has been successfully employed for surface hardening cast iron. Use of very short heating times to heat merely the superficial layers is peculiarly suited for hardening cast irons because of the greatly reduced dangers of heat-treating failures and the possibility of hardening without much distortion.

"Further extension of induction heating to hardening of steel products produced from steels other than the medium carbon type were made. Hack-saw blades of high speed steel, drills and bits of high speed steel and medium alloy steels, knife blades of cutlery, stainless steels, and other products are successfully hardened. Induction hardening parts such as these require a close study of heating cycles and of the metallurgical response of the particular steel composition to these cycles. The past year has seen the further extension of induction heating in the field of soft soldering and brazing of ferrous and nonferrous metal products.

"Induction heating is now a nonmysterious and acceptable tool in the heat-treatment of metals. Where definite economic advantages are to be derived, it is expected that the use of induction heating will spread. The great obstacle in the path of induction heating practice, however, is the lack of knowledge of how the performance of induction hardened parts compares with the performance of parts hardened by the older procedures. When a sufficiently accurate store of comparative data is obtained, a more logical basis for the employment of the process can then be made, and its sphere of application materially increased."

Scope of Electric Heat Treatment Is Broadened

John P. Zur, engineer, Trauwood Engineering Co., Cleveland: "Electric direct resistance heat treatment fills a long-felt need in making high tensile, high carbon steel wire. Application of this scientific heat treatment to rope, spring, and music wire makes it possible to obtain the best combination of strength, ductility, and fatigue resistance in the finished hard drawn or tempered wire.

"Electric heat treatment has broadened in scope in that it has been applied to the continuous strand annealing of stainless steel wire, and the tempering and annealing of high car-

bon steel strip. Trauwood direct resistance heat treating equipment has been in use in a number of wire mills in this country and abroad for several years. It has made it possible to broaden the field of application of steel wire and strip."

Full Meaning of Carbo-Nitriding Not Yet Completely Realized

W. H. Holcroft, vice president, Holcroft & Co., Detroit: "Full scope of carbo nitriding as a efficient modern heat treating operation, capable of producing hard surfaces of desired characteristics has not as yet been completely realized. By this process a greater depth of hardenable case is obtained in a given time, also the resultant wear resistance is greater. Carbo nitriding is cheaper, and the process is not dangerous to personnel.

"Carbo nitriding saves considerable time inasmuch as the process is carried on at higher temperatures and therefore a greater case depth is obtained per given time. Parts may be treated at low temperatures with subsequent slow cooling, thus minimizing distortion.

"Finally, the metallurgical quality of the product will be improved by new techniques in atmosphere control and quenching procedures."

Increased Use of Induction Heating for Forging Predicted

W. E. Benninghoff, general manager, Ohio Crankshaft Co., Cleveland: "In a survey of the metal working industry, executives were asked about contemplated purchases of machine tools and related production equipment in 1948. Answers indicated that the level of business in 1948 will be more than 20 per cent higher than in the year just completed. The picture looks particularly good from the standpoint of induction heating equipment. More than one out of every six plants interviewed said that they definitely anticipated purchasing one or more induction heating units during 1948.

"This great activity in the induction heating field is due in part to the lower cost it offers in production brazing, hardening and annealing work but more particularly to induction heating equipment's increased application to heating for forging and forming operations. Most such installations are large—from 100 kilowatts to 1000 kilowatts—but savings are large too. Uniformity of heating and lack of scale obtained with induction heating has increased life of forging dies up to 300 per cent."

Improved Processing Methods Vital to Metal Industries

Frederic O. Hess, president, Selas Corp. of America, Philadelphia: "During 1947 a single factor gave important aid in the over-all economics of producing metals and working them. In months marked by increasingly severe effects of wage scales and material costs, management in metal industries directed their efforts to improve mill and shop processing procedures.

"Recent changes in methods in mills and shops are deeper and wider than published reports have had time to show. Perhaps the expanding use of fast heating methods provides as clear a picture of transition as can be had. Specifically, metal producing and metalworking companies have a choice among conventional methods on one hand and, on the other, choice among high-frequency induction, high-speed gas combustion and, for some operations, oxyacetylene. In this choice, the prime factor, which we see in action, in instance after instance, is careful, studious weighing of merits as they apply to the conditions of the individual case.

"Metal industries have become increasingly aware that improvement in processing—in the quality of metal heating results and in the cost of getting them—is vital. More than that, they see that an improvement in metal heating is often not the simple matter of choosing a type of heating unit but a matter of revising a system. Their need is to gain the most in a combination of product quality and economy.

"Said another way, the metal industries are not thinking of speed for speed's sake alone. They see speed as giving opportunity to heat or heat treat work pieces one at a time in rapid succession. When the pieces, whether they be small or huge, are proceesed one at a time, opportunity is given to direct heat where it is wanted with intensity and duration controlled precisely. Handling gives rise to new arrangements by which processing is accomplished not in separate rooms or departments but in line with other plant or mill operations.

"This is a mode of thinking in which proponents of induction heating and high-speed gas combustion really stand shoulder to shoulder. They talk the same language in the interest of improving entire processes and in each proposed application the economic and metallurgical factors involved can be identified and closely evaluated. Industry is making its choice on the basis of definite figures, factor for factor, and this, of course, is as it should be."

Development Serves To Perfect Liquid Carburizing Baths

D. J. Richards, vice president, E. F. Houghton & Co., Philadelphia: "Further forward step in the perfection of liquid carburizing baths has been taken, in the form of a water-soluble carburizing salt which is capable of rapid carburization combined with ease of cleaning. The salt is removed from threaded or recessed parts merely by immersion and agitation in hot water. Water-soluble carburizers in themselves are not a new idea, but their difficulty has been to maintain a balanced bath with full carburizing value, when operated at a temperature sufficiently high to enable rapid case-hardening.

"With this new salt, it is possible to operate the bath at 1575° F and keep it in balance by normal production drag-out. Penetrations are comparable to those obtained in the barium-cyanide type of carburizing bath: About 0.013-inch in 30 minutes or 0.032-inch in 3 hours. Big advantage is in reduction of cleaning time for oil-quenched work."

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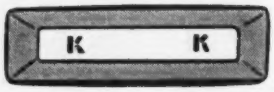

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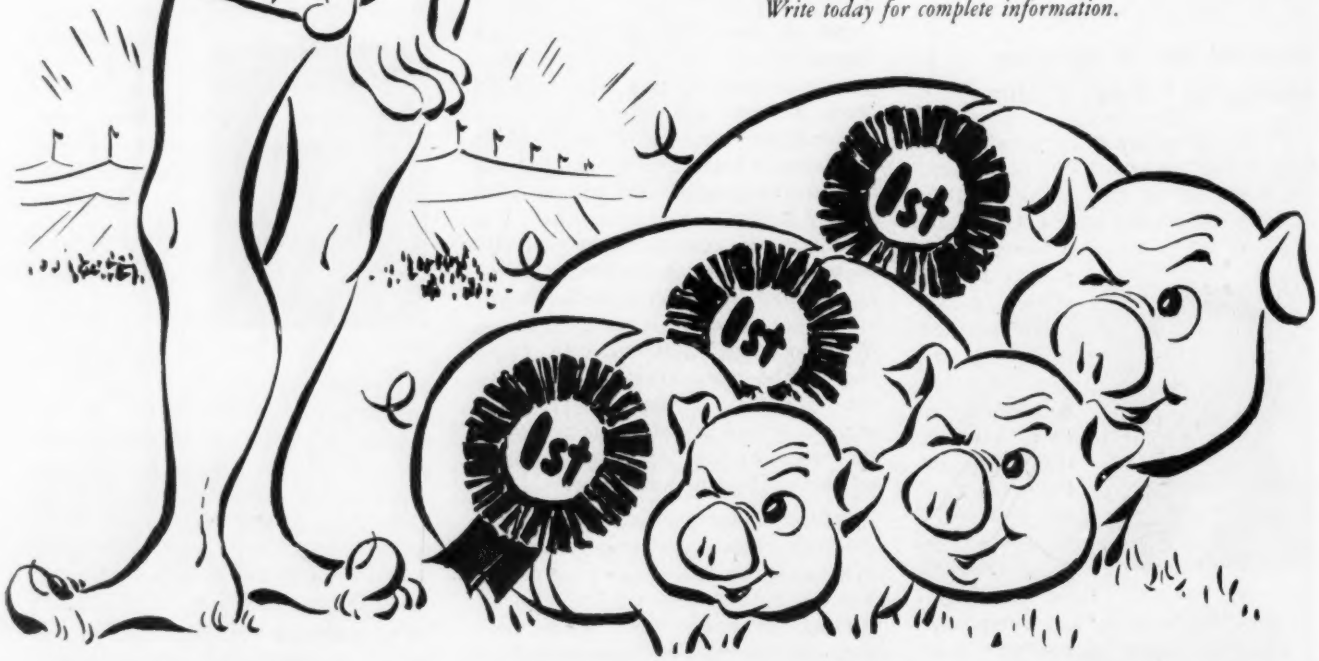

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Surface Treatment

Consumption of protective coatings at highest rate . . . Cleaner base metal for plating sought . . . Corrosion due to gas combustion studied . . . Backlog for zinc-coated products heavy . . Enameling activities impeded by raw material shortages

Consumption of Protective Coatings at Highest Rate

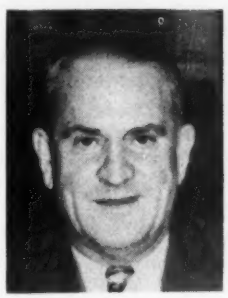
C. R. E. Merkle, manager, technical sales development, Philadelphia laboratory, E. I. du Pont de Nemours & Co., Philadelphia: "Increased demand for protective coatings as the result of delayed painting during the war and pent up demands for many of the appliances that the public has been denied during the past 4 or 5 years, all of which require finishes, have made it difficult for the protective coatings industry to meet fully the demands of the current situation. Not only are plant capacities being taxed, but more important is the fact that raw material supplies have in many cases been inadequate. While raw material shortages are being eased and the situation in general is improving, many shortages still exist. Meanwhile the consumption of protective coatings continues at the highest rate in the history of the industry.

"Industry in general has had its greatest technical advance during the past quarter century. The petroleum industry is a typical example, and as one who has lived with the protective coating industry for over 40 years, I can vouch for the fact that this is equally true of it. Chemical research is primarily responsible for this evolution in the protective coatings industry. Its inception was featured by the advent of low viscosity nitrocellulose finishes such as Duco in 1922, which subsequently completely revolutionized the finishing of automobiles.

"Many further improvements in finishing materials followed during the succeeding years resulting from the broad expansion of chemical research in the industry. These included the widely used alkyd finishes like Dulux. In the short span of a quarter of a century the industry has grown from a predominantly empirical art to a scientific chemical business of the highest order. The phenomenal advance of this period is bound to be accelerated as a result of established and sustained research. Many new ideas and potential new materials are in the test tube or more advanced stages of development in our laboratories. For the future, therefore, we can anticipate further advantages in the protection, decoration and the enhancement generally of all materials requiring protective coatings."

Growing Use of Enameled Steel Seen for Housing

E. Hogenson, executive vice president, Chicago Vitreous Enamel Products Co., Cicero, Ill.: "The porcelain enamel industry is an important contributor to the increased use of steel in the everyday lives of people everywhere. In the line of product development porcelain enamel and steel have been combined in the manufacture of washing machine tubs, refrigerator liners, kitchen ranges, plumbing ware, etc.



"With the establishment of porcelain enamel as a corrosion resistant, heat resistant and scratch resistant material, efforts were made to increase its acid resistance. Special acid resistant porcelain enamels were subsequently developed for use on products subject to constant acid exposure. Refrigerator liners, range tops and sinks are but three of many applications.

"Low temperature porcelain enamels which mature under the lower thermal critical of steel have now been developed. Their application in the architectural field alone is an important milestone. While porcelain enameled steel was previously used for modernization of old structures and for commercial buildings, it now will be widely used in the mass production of housing. This latest development represents a tremendous market expansion for both porcelain enamel and steel. And it is but one more of a progressive series. Others will certainly follow."

Emphasis Is on Obtaining Cleaner Base Metal for Plating

C. B. F. Young, electrometallurgist, Leonia, N. J.: "In the past year in the field of metal finishing, emphasis has been made on methods for obtaining cleaner base metal for the application of different types of plates. For a long time the cleaning of metals before plating gave trouble, especially where automatic plating was used to a great extent.

"This proved detrimental in many cases to the installation of automatic machinery. In order to overcome this an attempt was made to find new methods of cleaning the buffing composition and products of buffing and polishing from the work. Generally speaking, this was not satisfactory.

"In the past year a lot of work has come to a head on producing buffing compounds which are soluble in aqueous solution. Thus, the stick instead of being made of stearic acid is made of materials which have properties similar to stearic acid, and yet, which are soluble or dispersible in aqueous solution. In the opinion of the writer, this will revolutionize the polishing and buffing industry. To be sure, the soluble sticks of buffing compositions are more expensive but the work can be cleaned in much quicker time; therefore, there is an actual decrease in the over-all price rather than an increase.

"Along this same line, there were some developments in liquid buffing solutions. Here the buffing compo-

sition is in the form of an emulsion or suspension and actually flows to the buffing wheel in the liquid state. It is interesting that the buffing and polishing of metals and alloys should receive such an intense study after remaining for many years in a static state."

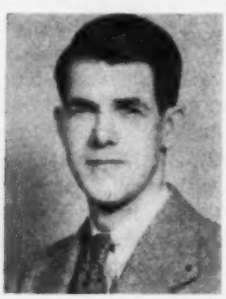
Trend Toward Combined Use of Plating with Organic Coatings

Richard O. Loengard, president, United Chromium Inc., New York: "In the field of surface finishing, one very interesting trend has been to the combined use of plating with organic coatings. During the war, shortages of some materials made it necessary to investigate use of substitutes and, as is so frequently the case in many instances, the net result was the working out of alternate procedures which give better results than the older procedures which they replaced.

"Development of new methods of electrolytic treatment, combined with the application of organic coatings developed as a result of the investigation of many new synthetic resins, has made available new systems of surface finishing for corrosion resistance and long wear."

Use of Titanium Opacified White Enamels To Broaden

W. A. Deringer, director, ceramic research & development, A. O. Smith Corp., Milwaukee: "Technically, the most recent development in the enameling field has been the development of titanium opacified white enamels. In 1946 these titanium opacified enamels were introduced on a production basis and immediately gave reflectances of 80 per cent with low application weights. Specifically, commercial white frits have improved from a total reflectance of 75 per cent in 1942 to 80 per cent in 1946, with no increase in cost per square foot.



"Adoption of these new enamels has been retarded somewhat by the scarcity of titanium dioxide. The properties of these enamels—high opacity, excellent acid-resistance, good gloss, and good abrasion-resistance—indicate that titanium-opacified enamels will become more widely used as they become available and eventually will replace most of the zirconium and antimony-opacified white enamels which have been used in the past."

Several Finishing Processes Combined in One Sequence

G. H. Pimbley, vice president and director of research, International Rustproof Corp., Cleveland: "We have noticed a definite trend recently among manufacturers of metallic products to seek improvement in the surface finishing. Backlogs of urgent orders are being worked down; improved finishing processes and materials for same are becoming more plentiful; manufacturers are looking toward future keenly competitive markets and striving to improve their products so as to achieve outstanding merit.

"In this program better resistance to corrosion and improved adhesion of organic coatings are essential; manufacturers therefore are turning as never before to phosphating treatments, coupled with high resistance synthetic resin finishes. It is now feasible to combine all of these finishing processes in one sequence of rapid economical operations, so as to achieve cleaning, phosphating, and finishing with metallic or colored synthetic resin plastic baked coatings, all with one continuous handling of work.

"These methods are particularly adapted to mass production of miscellaneous small parts such as nuts, bolts, clips, brackets, etc., parts which in the past have often been 'short changed' on protection against corrosion—such parts may now be adequately protected without clogging of threads, excessive build up on dimensions, and with speed and surprising economy. We look confidently toward greatly increased use of such processes, as well as increased employment of phosphating under organic coatings for better adhesion over steel, zinc, cadmium, and aluminum surfaces."

Aluminum, Zinc, Phosphate Coated in Single Solution

V. M. Darsey, president, Parker Rust-Proof Co., Detroit: "A development of unusual interest to metal fabricators is Bonderite 170, a process for producing a phosphate coating on aluminum zinc and steel in a single solution without the aid of electricity; it may be applied by either spray or immersion application. Making possible the use of Bonderizing to coat metals other than steel in a single solution has provided an economical method of preparing a combination of metals for painting which eliminates the necessity of dual equipment.

"The crystalline Bonderite coating produced by the treatment inhibits corrosion and provides an excellent base for organic paint finishes. The process is in commercial use in hundreds of installations wherever the prevention of corrosion on these metals is of importance."

Galvanizing Dross Losses Corrected by Kettle Lining

W. H. Spowers Jr., consulting engineer, New York: "Although much progress has been made in control of dross losses in galvanizing by the wide acceptance of deep fired settings and No. 20 flux, there still remains to be corrected that portion of the loss attributable to the dissolving away of the side walls of the kettle.

"In this regard it should be noted that patents have been issued covering the correction of this loss. A metallic lining will be offered which, it is expected, will not only permanently prevent the deterioration of the

How the First All-Steel Welded Vise is Made

By H. F. Seymour, President
Columbian Vise & Manufacturing Co.
Cleveland 4, Ohio

WHAT is believed to be the first all-steel vise fabricated by arc welding is the Columbian Work Shop Vise shown in Fig. 1. This vise was redesigned in collaboration with Parsons Engineering Corp., welding specialists, from conventional construction to arc welded steel to achieve superior strength, accuracy and long life.

Basic material used is SAE 1020 hot rolled steel plate, punched and formed to the proper shapes. Fig. 2 shows the component parts. The base plate is 3/8" thick,

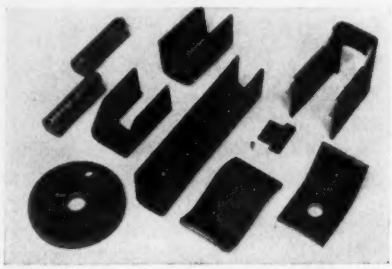


Fig. 2. Component parts of the vise.

the nose piece 5/16" and all others 3/16".

The first fabricating operation is the welding of the front, or sliding, half. The rail, T-blank, front body and jaw are assembled in a jig and tack-welded In

Fig. 3. Welding front body to rail with inside fillets.

this same jig the front body is welded to the rail with inside fillets (see Fig. 3), and the nose piece tacked on.

This front half is then passed to the

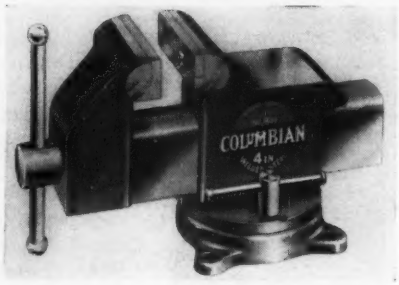


Fig. 1. The Columbian all-steel welded vise.

next welder, who makes the final fillets which join the nose piece and T-blank to the front body. The next operator welds the jaw to the nose piece.

Meanwhile, the rear half of the vise is being assembled in similar manner by another bank of welders. The rear body and swivel base are assembled in a jig and tacked together by the first man. The next man welds these parts with continuous fillets.

The front half and the partially-assembled rear half of the vise are then passed to a welder who fits them together. He inserts the sleeve, or inside guide, in the rear body, slides the rail of the front half through it, and welds the sleeve to the rear body with four 1-inch welds. Fig. 4 shows how the assembly is clamped in the jig. He then tack-welds on the rear anvil.

The vise then goes to the last welding operator, who welds the rear jaw to the anvil and the anvil to the rear body.

The vise assemblies are passed from one operator to the next by means of steel chutes.

Air hammers are used to peen the welds and clean off the spatter, and the welds are then ground smooth. Hardened steel jaw faces are drilled and counter sunk into the jaws. The screw and handle are forged steel and the malleable iron nut is replaceable.

AWS Type E-6030 electrode is used for welding the rear body to the base in

Fig. 4. Raising clamp which held inside sleeve for welding to rear body.

order to get a fillet with exceptionally deep penetration. For all other welds, E-6012 electrode is used.

With 12 set-up men and welders, 1,000 vises are produced a week. Production can be stepped up to 2,500 a week by increasing the force to 22 men.

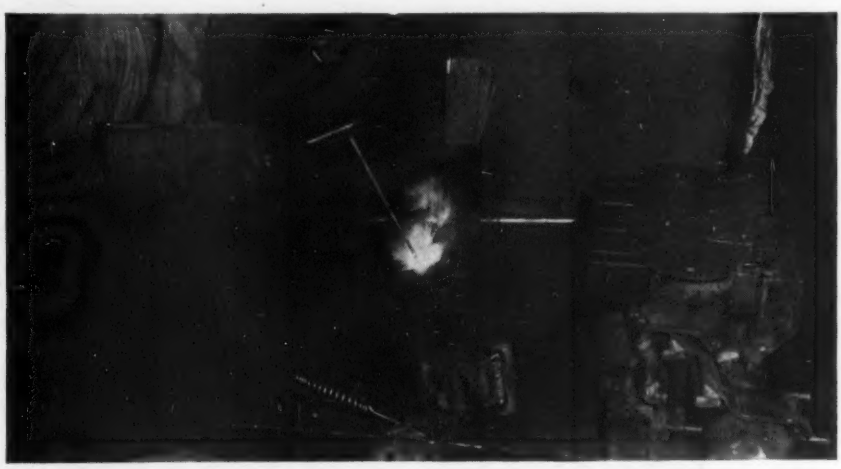


Fig. 5. Making final welds—anvil to body, and jaw to anvil.

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Advertisement

kettle walls, but will permit the operation of the process at higher than usual temperatures. Temperatures of about 900° F for the zinc will yield vastly more ductile coats, particularly in the heavier grades of coating. These features could only be accomplished by the use of an indestructible galvanizing kettle as is covered by these patents."

Metal Corrosion Due to Gas Combustion Studied

Eugene D. Milener, director, utilization research, American Gas Association, New York: "The battle against corrosion of metals is one of the biggest of industrial battles and it is a never-ending battle. Recently, a new phase of corrosion has been seriously attacked at Battelle Memorial Institute under the sponsorship of the Committee on Industrial and Commercial Gas Research of the American Gas Association. This research work is attacking the problem of corrosion of metals caused by the products of combustion of gas in both the vapor phase and in the condensate phase. Work is being directed by Dr. H. A. Pray of the Battelle staff.

"The first report, recently issued, is entitled 'Literature Review on Corrosion of Metals and Materials by Flue Gas Condensate' and consists of not only the literature review but also certain observations made in the field, and a preliminary analysis of the problem. Laboratory work on products of combustion with different kinds of gases is now well advanced. There has been developed and built an ingenious machine that tests through various cycles up to twenty samples of metal simultaneously. In order to expedite the work three additional machines are now being completed and put into operation.

"The Committee believes that the results of this work, when finally completed, will be of material assistance to designers of gas house heating furnaces, gas boilers, and other gas appliances and that it will also be helpful to mill operators and others who supply materials used in the manufacture of gas appliances. It is expected that the next report which will include the results of the present laboratory work, will be published in 1948."

Solventless Vehicles Introduced In Coatings for Various Uses

C. Stewart Ferguson, engineering manager, resin and insulation materials division, chemical department, General Electric Co., Pittsfield, Mass.: "One of the year's most interesting developments in the field of surface coatings is the introduction of completely solventless vehicles which hold much promise for the future in coatings for a variety of applications. Essentially of the alkyd type, these liquids which can be produced in a wide range of viscosities convert with heat to tough, flexible coatings.

"At present, they are contemplated for use as flexible fabric coatings and will undoubtedly be considered for floor coverings. Metal decorating is another field in which these new liquids should find many uses. Ease of application and rapid conversion with heat together with the solventless feature are among the many desirable characteristics of these vehicles."

New Raw Materials Available For Metal Protective Paints

George Diehlman, research laboratories, National Lead Co., Brooklyn, N. Y.: "Many new raw materials have become available for use in metal protective paints as the result of recent research. One of these is a corrosion inhibitive pigment designated as pigment E which is now available for producing metal protective paint coatings.

"This pigment is a double chromate of barium and potassium with the chemical formula ($BaK_2(CrO_4)_2$). This new pigment possesses a desirable combination of properties, most important of which is its uniform release of the corrosion inhibitive chromate ion (CrO_4) in the presence of water. Unlike other chromate type pigments, it is singularly low in soluble chlorides and sulphates which are known accelerators of corrosion. The material is used in paint compositions in the same manner as most corrosion inhibitive pigments usually admixed with other pigments.

"Among the newer synthetic resin developments used in the vehicle portion of metal protective paints are the styrenes, silicones, and vinyl copolymers. Paint systems utilizing air drying type vinyl copolymer vehicles have shown excellent performance under adverse exposure conditions whether acidic, alkaline, or saline in nature.

"By the judicious use of such new product developments effective long time protection of iron and steel surfaces can be obtained."

Backlog for Zinc-Coated Products Still Heavy

Ernest V. Gent, secretary, American Zinc Institute, New York: "To a very substantial degree, the backlog of demand for zinc-coated products continues unsatisfied. For some time past, current zinc production has been sufficient to meet galvanizing requirements, but steel continues to be the limiting factor. Nevertheless, interest is very much maintained in new mechanical equipment and operating techniques to improve the product and reduce costs.

"Dearth of new galvanized roofing and siding has greatly increased interest in maintaining and extending the life of old installations in the farm and industrial fields. In this connection, use of metallic zinc paint with a high zinc dust content is proving its worth. Use of this paint by the services during the war prompted Army, Navy, and federal specifications which, together with the favorable results of long-range tests, have added greatly to the interest and the expansion in use of this corrosion-resistant paint.

"Zinc die castings continue at the record-breaking high level of acceptance attained since the war, such new applications keeping down overall

costs on many different postwar designs. So far, the supply of special high grade zinc has been sufficient for these needs.

"It will be interesting to see whether rolled zinc and rolled zinc products maintain the high consumption point of about 100,000 tons a year reached in the two preceding years. Continuous efforts are being made to establish uses which promise a stable, rather than a transitory, consuming market."

Hot Dip Galvanizing Aided By Mechanical Handling

Wallace G. Imhoff, president, Wallace G. Imhoff Co., Los Angeles: "Perhaps the most important advancement in the science of hot dip galvanizing during the past year is to be found in the mechanical handling, and advanced galvanizing practice used in hot dip zinc coating of hot water heater tanks. Handling from start to finish is on a monorail conveyor system. The heads and bodies are processed in one piece through the standard operations of hot dip galvanizing practice; the bottoms are processed separately, and pressed into the tanks, and then both zinc coated parts are welded together.

"Production is greatly increased over the old methods employed in this field of galvanizing, and the quality is far better. The new technique eliminates many of the most serious defects that are almost always present when the old methods are used. This advancement to more modern methods of handling in the field of hot water tanks will no doubt be followed by better handling methods in similar fields of galvanizing, such as metal ware.

"Preheating and corrosion after pickling have presented many difficulties in all fields of galvanizing, but in the not distant future mass production and conveyor systems will no doubt be used in all fields of hot dip galvanizing.

"Another development important to all galvanizers is the handling of and proper disposal of galvanizer's wastes. The increase in population in most cities is forcing them to pass city ordinances in regard to the disposal of waste pickle liquors, and improved and more scientific handling of galvanizing fumes. It is very important that galvanizers become more interested in these problems so that the solution will be satisfactory to them rather than a great hardship if negleced and left to those not qualified to solve such highly technical problems."

Enameling Industry Limited By Raw Material Shortages

G. H. McIntyre, vice president and director of research, Ferro Enamel Corp., Cleveland: "The enameling industry has been extremely active during the past year and is limited, apparently, only by the general raw material and steel shortages. New acid resistant, highly opaque sheet steel cover coat enamels made from relatively high percentages of titanium dioxide have come strongly to the fore because of their many advantages in more covering power and acid resistance.

"These new enamels, the principles of which have been known for many years, have only recently been perfected to the point that they can truly be called commercial. They are replacing the familiar zirconium and antimony opacified enamels because of their extreme whiteness enabling the enameler to use 50 per cent thinner coatings with higher covering power. They also give high gloss and stainless qualities while at the same time being sufficiently workable in the enamel shop to make them desirable for all types of application. The great shortage of titanium dioxide which is in high demand in the paint and allied industries has prevented the application of this type of enamel as widely as it would otherwise be.

"Another important trend in the industry is the adaptation of so called high speed ground coats almost uniformly. These ground coats permit the firing of the cover coat and ground coat together on a continuous furnace at the same time and temperature cycles thereby permitting the enameler wider flexibility in his operations. Use of special steels and still lower firing enamels is being considered by many frit concerns and enamelers with the object of decreasing warpage and lowering costs. These enamels fire in the range of 1350° F and are finding some rather extensive acceptance in the architectural field for interior use.

"Steel homes with porcelain enamel interior and exterior appear to be well on the way to commercial production. Several new semimatte acid resistant architectural finishes are available and this method of home construction may be one of the major developments of the near future. The porcelain enameling industry is enjoying one of its best markets and should continue to do so for several years to come. The demand for porcelain enameled durable goods is greater than ever."

Cites Recent Developments in Processes for Coating Aluminum

F. Keller, chief, metallography division, Aluminum Co. of America, aluminum research laboratories, New Kensington, Pa.: "In the past year, much interest developed in the use of many chemical and electro - chemical treatments that are available for applying protective and decorative finishes to aluminum articles. Demand for brighter and more attractive finishes is more insistent than ever.

"Although the anodic oxidation process leads the field where high quality plain and colored surface coatings are required, some recent developments in chemical coating processes have aroused considerable interest for applications where coloring is of prime importance and the thicker and more abrasion resistant electroyltic oxide coatings are not required.

"Another field of surface treatment in which there has been more than the usual amount of activity is that involving the electro-plating of aluminum articles. In electroplating aluminum alloys, the initial cleaning and conditioning treatments are of utmost importance, and influence to a large degree the adhesion of the plating and its appearance. The zinc immersion process is one of the best treatments for preparing aluminum alloys for plating with copper, nickel and chromium.

"Recent advances in cleaning treatments prior to zinc immersion re-

sulted in obtaining more consistent and better results with this process. With suitable surface preparation the electroplating of aluminum alloys is no more difficult than the electroplating of other metals."

Rapid Expansion Noted in National Plating Capacity

Myron B. Diggin, technical director, Hanson-Van Winkle-Munning Co., Matawan, N. J.: "The metal finishing field the past year has witnessed a rapid expansion of productive capacity in decorative and corrosion protective plating, with emphasis on automatic buffing, plating and handling. In order to combat rapidly rising costs, manufacturers of articles that require polishing, plating, chemical or organic finishes have been quick to adopt new methods, processes and equipment and have shown an increased interest in scientific process control.

"Liquid composition applied by spraying, new polishing wheel cements, the use of abrasive belts and new types of buffing wheels have increased the efficiency and production. Basic studies of factors influencing buffability of metals were reported at the American Electroplaters' Society Convention in June.

"Electropolishing is being used extensively on a commercial basis. At first limited to chromium and chromium-nickel steel, it is now applied on a commercial scale to brass, aluminum and nickel-silver with excellent results and has been claimed to give satisfactory results on silverplate. In the electroplating field there has been a great deal of interest in alloy plating for automotive and truck bearings using lead-tin-copper alloys, on magnetic tapes and decorative coatings using cobalt-nickel alloys, copper-tin-zinc alloys for decorative and engineering applications and lead-tin or lead-cadmium alloys for numerous purposes.

"The new development using steel wire cords in place of cotton, rayon or nylon in heavy truck tires has stimulated brass plating, in which an extremely thin brass coating over the steel increases the bond strength of the rubber.

"Important developments have been made in the deposition of cadmium, zinc, copper and nickel. Cadmium can now be deposited at high current densities with a bright, lustrous finish, eliminating the usual bright dipping. Zinc is being deposited commercially from fluoborate and chloride electrolytes. Copper, traditionally deposited from either cyanide or sulphuric acid solutions, is now being plated on an appreciably large scale from pyrophosphate, fluoborate and diethylene triamine solutions. New semi-bright nickel solutions have been developed which produce deposits that have scratch-covering properties and are easily buffed, thus reducing finishing costs.

"Periodic reverse current plating, wherein the normal direction of current is reduced at certain regular intervals, shows promise of extensive use in various electroplating solutions. Smoother, less porous and brighter finishes can be obtained by this process. It permits faster plating, gives better deposit distribution and lessens buffing costs. Improved electronic control and contactor equipment for this process is now available."

Progress in Finishes Important From Cost Point of View

Colin G. Fink, head, division of electrochemistry, Columbia University, New York: "Developments in finishes is very important from cost point of view. Today we can electropolish practically every metal at a cost far below that of hand burnishing or polishing. This also implies saving of precious metal. The basic metal is brought to a high luster and the finishing metal such as silver or gold or rhodium in the case of jewelry; or nickel and copper in the case of decorative ware of all kinds such as bathroom fixtures, etc., are applied in a fraction of the time formerly required.

"Bright surfaces can be further protected by applying a thin coat of one or the other new plastics. Formerly we were very much limited in the choice of varnishes and lacquers, but now with the large assortment of new plastic materials we can select the one most suitable for the particular case in question.

"Electrogalvanizing is proceeding at a pace that would indicate the reduction in hot dip galvanizing to such an extent that many of the galvanized articles will no longer be hot dipped. Important in this connection is the reduction in our zinc reserves. According to government estimates, another generation will find us very short of zinc, as well as of two or three other metals."

Sees Need for Speedier Finish Evaluating Methods

Wm. E. Shaw, head, corrosion dept., research laboratories, National Lead Co., Brooklyn 1, N. Y.: "Need for a better understanding of the protective mechanism of paint films and speedier methods for evaluating the various paints is becoming more evident. Where the paint formulator of 15 years back had only one or two good metal protective pigments to work with and, in general, one vehicle, the modern corrosion engineer has many potentially satisfactory pigments and literally thousands of vehicles to choose from.

"Thus, the need for the understanding of how the paint protects and how quickly it can be tested is evident.

"The advent of the electro-chemical theory has done much to give an understanding of corrosion underneath a paint film and it has supplied a means for showing when a paint has failed. For when corrosion of the iron starts, the half cell potential of the specimen becomes negative, a complete reversal of sign having occurred and thus a good indication as to the start of corrosion.

"Using this research tool and his scientific training, the corrosion engineer can now 'weed out' rapidly the ineffectual anticorrosion paints. However, the laboratory test can never supplant the practical long term exposure test but it can supplement it by allowing it to be used on only those paints that are worthy of the amount of time and money necessary for its most efficient performance.

"When data from electromeasurements of a paint are properly interpreted, many properties of a paint film are known. The start of corrosion and its rate can be ascertained. Thorough study can often show which of the many factors influencing corrosion is operative at the time of measurement. A follow-up of these factors can determine why the paint protected or failed and what should be done to make it better."

Lubrication

Increased use of water-soluble coolants noted . . . Roller bearing mountings aided by oil-injection method . . . Uniform lubricating system best management investment . . . More nonsoap greases used in metalworking field

Mounting of Roller Bearings Aided by Oil Injection Method

A. Stewart Murray, assistant chief engineer, SKF Industries Inc., Philadelphia: "SKF has developed an oil injection method that greatly simplifies the making and breaking of heavy interference fits. The application of this technique to mounting and dismounting roller bearings represents an outstanding improvement of primary importance to all maintenance departments. The oil injection method is based on the fact that friction between contact surfaces of a pressure joint during assembly and disassembly, can be almost entirely eliminated through the injection of oil under pressures of 5000 to 30,000 pounds per square inch, the required intensity varying with the specific pieces.

"Experiments have demonstrated that by the use of oil, friction between contact surfaces can be reduced to 1 to 2 per cent, and less, of that which would otherwise prevail at the interference joint. This method can be used to dismount straight bore bearings, and to mount and dismount tapered bore bearings. Size is no limitation on such ability and, as a matter of actual fact, the oil injection method is of greatest help with the largest pieces.

"The original problem that inspired the above method was the development of a rigid coupling to overcome the objections to the older removable types. This new coupling depends upon pressure only and unites two purely cylindrical shaft ends without the use of keys or any similar device. The clean lines of the coupling make any guard quite unnecessary and the coupling is so dimensioned that it can transmit torque up to the point where ordinary shafting passes through the yield point and takes a permanent set.

"Many maintenance jobs can be made less difficult and time consuming, that are today quite difficult because of the problem of disassembling large pieces assembled with heavy interference fits. Many variations of this system are possible and it has been adapted to parts quite unrelated to couplings and bearings. Those maintenance departments that begin immediately to modify their equipment, the slight amount necessary to use this method, will soon adequately appreciate the full possibilities and great help of this oil injection method in the making and breaking of heavy interference fits."

Prelubricated Sealed Bearings Run 9 Years Without Regreasing

D. E. Batesole, vice president, Norma-Hoffmann Bearings Corp., Stamford, Conn.: "Oustanding development in the field of antifriction bearing is the application of prelubricated sealed bearings for long-time operation without additional lubricating attention. This has been made possible through the development of superior bearing greases which will not oxidize nor dry out and which have a uniform consistency over a wide temperature range. When used in bearings of a wider than standard type, equivalent to the width of a double row bearing, field service records have been obtained which reveal the bearings have operated over nine years without regreasing. Furthermore, the bearings in this case were operated under adverse conditions of temperature and humidity which tends to reduce life of lubricating grease.

"Excellent progress has also been made in the development of bearing greases for high temperature operation. On a recent laboratory test 'Cartridge' ball bearings were examined after running 10,000 hours at 300° F. The grease was found to be in excellent condition and apparently good for additional running. Furthermore, the bearing itself did not show any noticeable wear."

Trend Toward Use of Water Soluble Coolants Is Noted

A. E. Carpenter, president, E. F. Houghton & Co., Philadelphia: "As we approach a new year and pause to survey metal working progress since the war ended, there are several sign posts that seem to be prominent in the field. Perhaps first is the great increase in hydraulically operated controls and mechanisms which have spread from small aircraft installations to the smooth, accurate operation of huge machine tools. This was evident at the Machine Tool show in Chicago last September. It is reflected in our own business by an upsurge in demand for adequate packings and stable hydraulic oils. Our leather and synthetic rubber packing business was never better and the interest in our new hydraulic oil handbook indicates also an appreciation of the need for oils treated especially for use as pressure media.

"Another sign of the times is the trend toward increased use of water-soluble coolants, likewise demonstrated at the Machine Tool show. A great percentage of the new tools were operated on mixtures of oil and water. New developments in that type of product have stressed antiseptic and detergency values, creating a new concept of the functions of a cutting oil aside from prolonging tool life and aiding in finer finish.

"Now comes a new type of concentrate miscible with either oil or wa-

ter, an all-purpose base which is high in sulphur, giving it good anti-welding characteristics, yet forming a stable emulsion. This product has caught on rapidly and is making good strides, indicating that the ultimate in cutting oils has not yet been witnessed despite great advances during war production.

"A third change in metal processing is seen in the cleaning of metal. Production line cleaning has heretofore ranged from the old type alkaline compounds, to automatic straight solvent degreasing. Now an emulsion type cleaner has been perfected which, as Frank Munsey used to say of his newspaper mergers, 'combines the best features of each'. One of the new Houghto-Clean series is a nontoxic emulsion-type cleaner which was originally devised as a replacement for scarce alkalies. Even at a proportion of 2 or 3 per cent with water, this cleaner removes oil and soil and leaves a faint film which helps to prevent early rusting.

"It does not leave a chemically clean surface, because of this slight oil film, so cannot be used for parts to be plated or porcelainized. For many jobs, however, this emulsion-type cleaner, used from straight to a 5 or 10 per cent solution, does an excellent cleaning job at extremely low cost. Its flash point is high, and it does not dull the metal.

"In the field of heat treating, everyone is familiar with the progress made against distortion by application of the interrupted quenching principle. Martempering and austempering are now applied on a production line basis. The newest salt bath application is for cyclic annealing of forgings, moving the bath to the forging press and reducing annealing time from many hours previously required to a matter of minutes. Pickling or shot blasting are no longer needed, as no forging scale forms when hot parts off the press are immediately immersed in salt. The degree of annealing can be controlled within close limits, thus improving machineability. This process has been under close scrutiny by large plants and is now being extended to full-scale production."

Open Gear Lubrication Presents Difficult Problems

Joseph A. Rigby, chief engineer, Brooks Oil Co., Pittsburgh: "Lubrication of open gears presents a difficult problem because of the characteristics necessary for efficient lubrication. Present day economic considerations demand longer gear life and minimum power requirements to offset maintenance and production costs beyond the control of management.

"The ideal lubricant, such as Leadoline Klingfast special, should be one for ease in application, adhesiveness to prevent throw-off, exceptionally high film strength, ability to withstand low and high temperatures, negative in corrosive activity, repellent to water, high imperviousness to salt water, acids and other lubricants, a film of minimum thickness and nature to maintain frictional drag to a minimum and of semi-hardening nature to prevent drippage and resist abrasion."

Uniform Lubricating Systems Best Management Investment

E. J. Ehret, Chicago district representative, Farval Corp., Cleveland: "Today it is next to impossible to get all production equipment bearings lubricated often enough to prevent wear, lost time and costly shut downs. Any new equipment should have a good centralized lubricating system included in the specifications. Since you have to live with the equipment when you get it, you might as well specify the system you want.

"Furthermore, make sure that each vendor supplies the same make of system—there is a vast difference. If you do, your lubrication men will understand its operation, maintenance and also what type of lubricant can be handled. Certain systems eliminate springs, check valves and small restrictions to flow and therefore, can handle any lubricant that can be pumped through the line; others cannot.

"After seeing that all new machinery comes in with centralized lubricating systems, then start on old machinery you intend to keep. Take one department at a time and ask top management to provide money for one kind of centralized system for all the equipment that warrants it. Don't have some machines with oil cups, others with grease cups, some with multiple tubes and some with centralized systems. Think of the poor oiler, with an oil can in one hand, a bucket of grease in the other and a grease gun under his arm.

"In each plant some one individual must take up the cudgels and push for better lubrication. It may be the superintendent, or the master mechanic, or the plant engineer—but in every organization there should be one man who knows that you must have a centralized lubricating system to insure proper and unfailing lubrication to thousands of bearings on production equipment. It is the best investment management can make."

Suggests Key to Modern Industrial Lubrication

James G. O'Neill Jr., Sinclair Refining Co., New York: "Key to modern industrial lubricating practice consists in using one oil for all units where this oil can be efficiently used. Through this means all mechanical units are classified into groups depending upon what oil they require. In this way each mechanical unit is not considered as a separate entity but is put into its proper place in relation to the lubrication of all the machinery.

"A direct connected turbo-generator set may, with this procedure, use the same lubricating oil as used in many other units such as certain hydraulic pump systems, electric motors, etc. The same oil in use in a geared turbine may be used to lubricate a compressor, an internal combustion engine, etc. The most critical unit, from a lubricating viewpoint, determines the selection of the oil.

"Such a system results in segregating notorious wasters of lubricating oils. These can be then lubricated by relatively inexpensive general purpose (red engine) oils.

"The above system may appear at first glance to be impractical from a cost viewpoint. Certain of the units will, under this system, be using oil superior in quality to that normally required. Upon consideration it will become apparent that while, in a few instances the cost has been slightly increased, the number of lubricants has been very greatly reduced.

"This reduction in the number of lubricants has greatly lowered stor-

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age and lubricating equipment costs. It has decreased confusion in lubricant application with the resultant decrease in errors which cause high maintenance costs and mechanical failures. Combining the advantages it is found that overall costs of lubrication are actually considerably cheaper."

Stresses Importance of Oil Purification Equipment

B. F. Hunter, consulting engineer, Honan-Crane Corp., subsidiary of Houdaille-Hershey Corp., Lebanon, Ind.: "The life, performance and maintenance costs of every machine depends on lubrication. To obtain the economies of proper lubrication, the lubricant must be of the proper type and free from abrasives or other objectionable contaminants. In the design and operation of machines it is practically impossible to keep the lubricant, during its useful life, free from objectionable cantaminants.

"During the past few years much progress has been made in the development and manufacture of adequate oil purification or oil reclamation equipment to maintain lubricating oil in its original clean condition, to meet practically every industrial requirement. There are many methods employed in the maintenance of lubricants depending upon the specific requirements, such as purification, filtering, screening, centrifuging and settling. No one particular method can meet all requirements or conditions.

"Therefore, selection of the most effective and efficient oil purification or oil reclamation equipment must be based on the type of oil, the volume of oil to be maintained and the nature and amount of objectionable contaminants to be removed. The ideal equipment when adapted for the average industrial plant may involve one or more of the various methods developed.

"During recent years many of our major industries have installed elaborate centralized systems whereby clean oil may be delivered through pipes to the various machines and returned to the centralized system where all objectionable contaminants are automatically removed, thus insuring machines of clean oil at all times.

"Many of these centralized systems represent a capital investment frequently in excess of $100,000. Many industries operating such systems report that the savings in general operating costs were sufficient to pay for the system the first year of its operation and have been returning similar savings each year of its operation.

"Such savings will result from increased production (less down time for machines), reduced maintenance and better finishes with fewer rejections, such as in the case of machine tools requiring cutting or grinding coolants; also, clean hydraulic oils, quenching oils, metal washing oils, naphthas, fuel oils, insulating oils, and many other types of petroleum products. Oil purification or oil reconditioning equipment is available for centralized systems, individual machines or portable equipment which can be moved from one machine to another and the oil reconditioned at the regular intervals as required.

"The proper selection of the oil purification or oil reconditioning equipment is all-important and should be given careful consideration and frequent laboratory tests to be assured of the most efficient and effective method to meet specific or various requirements. Value and economy of clean oil is fast being recognized by our major industries and promises to become a valuable contribution to industry in reducing the ever-increasing manufacturing costs."

Improved Quenching Oil Offers Maximum Hardness, Less Distortion

E. L. H. Bastian, lubricants staff engineer, Shell Oil Co. Inc., New York: "Tremendous current demand on the steel industry for continuing high production has focused considerable operator attention upon new and better maintenance and process supply items, including steel mill lubricants. Recognizing the importance of this factor, research is being utilized toward development of a number of new products in this field.

Improved types of steel drawing compounds are being investigated to replace or supplement more conventional products now generally available. This study pertains both to water soluble and oil type products dependent upon specific mill application requirements.

"Announcement will be made soon of a new premium type quenching oil expressly designed for very high speed quenching where maximum hardness is desired with minimum distortion—such as low carbon, or low alloy steels normally having low hardenability ratings. In both thermal and metallurgical tests this product has proved outstanding in many respects.

"Work is now in progress for the development of a superior martempering oil which will be made available after thorough field testing.

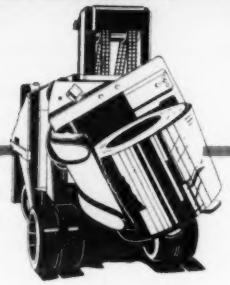
"Recognizing the problems and difficulties experienced by the steel industry in combatting rust and corrosion, an endeavor is being made to help them overcome these difficulties by developing more effective rust preventives."

Use of Nonsoap Greases Increasing in Metalworking

Clifford C. Goehring, engineering division, Standard Oil Co. of New Jersey, New York: "An ideal lubricant for open gears would possess the following properties: Adhesiveness, high film strength, resistance to the washing action of water, uniform consistency over a wide range of temperatures and ease of application.

"These requirements are met with a line of nonsoap greases recently developed to satisfy unusual lubricating requirements. By departing from conventional types of gear shields, unique properties are gained which should be of interest to all consumers of lubricants.

"Designers of metalworking machinery continue to utilize open gears. Field experience with these lubricants has indicated particular suitability in such service, and their use is increasing. Among the unusual combination of properties are excellent resistance to the washing action of water and steam, high film strength and dropping points above 500° F."



Materials Handling

Crane control allows use of cheaper power . . . Management co-operation required to "lick" handling problems . . . American industry leans heavily on efficient materials handling . . . Maintenance key to best plant-truck output

Crane Control Development Allows Use of Cheap Power

F. M. Blum, sales manager, overhead travelling crane division, Harnischfeger Corp., Milwaukee: "Improvement of speed control for alternating current powered overhead traveling cranes has been of chief concern to the crane builder. Heretofore it was believed that an overhead traveling crane requiring fine speed regulation, for accurate spotting of loads, would necessitate its being built for direct-current operation. Characteristics of an alternating current slip ring motor and the speed control obtained on a crane equipped with a mechanical load brake were such that the crane was not suitable for installations requiring accurate speed regulation. The mechanical load brake was a source of maintenance and coupled with the poor speed control has kept the use of alternating current powered cranes in the background, although the cost of alternating current was considerably cheaper than that of manufactured direct current.

"Control circuits were designed to provide for the elimination of the mechanical load brake but most required excessive current in the hoist motor. During the past year we introduced Magnetorque crane control for alternating current operated cranes, which allows cranes to be used where it was formerly thought only direct current cranes would serve the purpose. This Magnetorque control can be applied to either manual or full magnetic control, eliminating the mechanical load brake. Magnetorque provides speed control, both in lowering and raising, superior to that obtained with a crane operating on direct current power supply. Progress has been made during the past year in the field of overhead traveling cranes, permitting the alternating current crane, with its cheap power supply, to be more universally used. This new control provides very flat speed load characteristics, making it ideal for crane installations, such as powerhouses, foundries, machine shop, and assembly floor operations."

Materials Handling Problems Need Management Co-operation

R. W. Mallick, assistant to director, headquarters manufacturing engineering department, Westinghouse Electric Corp., Pittsburgh: "Many sign posts verify the statement that the material handling industry has come of age. Probably most significant is the interest that is being shown by our leading technical societies. The material handling division of ASME is very active. The AIEE recently appointed a subcommittee to foster material handling electrical equipment standards. The Material Handling Society, born in Pittsburgh, finds sections springing up in other cities. There is hardly a technical society convention that does not include a material handling session in its program.

"Inertia in industry is finally being overcome, and the wheels of progress are beginning to turn, so far as overcoming the greatest single obstacle to improving production. This can be done without further technological development of processes and materials. More productivity per manhour, per square foot of floor space, or per dollar of plant investment are no little rewards. They offer real incentives in these days of high unit costs.

"Materials handling equipment producers, consulting engineers, and the plant engineering staffs of most corporations are ready to do their part in the battle against this destroyer of production efficiency and profits. Top management must give the green light.

"Every executive should recognize the fact that there are only three basic operations in all industry, namely—processing, assembling and handling. Handling continues to consume the greatest amount of labor effort, while contributing least to product value. By the rule of inversion it is also receiving least management attention. Why not do something about it now."

American Industry Dependent On Capable Materials Handling

J. W. Wunsch, president, Silent Hoist & Crane Co., Brooklyn, N. Y.: "During the war many people had a reaffirmation that in machinery as in men quality will tell. The performance of pleasure automobiles and trucks must have surprised even the men responsible for their design and production, and their record is the best compliment to the industry. Less spectacular, but as vital to the war effort and to industry and progress since the end of the war, is the story of the industrial crane and other items of material handling equipment.

"When the Germans destroyed many of the cranes and dock facilities of the English ports, the nation and our combined war effort came to depend in a large degree on the mobile versatile industrial crane for cargo handling. American industry has long since recognized that its continuous, efficient and economical operation depends on its material handling methods and equipment.

"There is probably no machine in the world that is as subject to dangerous abuse as the crane and that is probably also true of other material handling equipment. The honesty of purpose is the quality that will tell. If the machine is of sound

design and is well built, it will stand the day-in day-out overburdening and abuse."

Continued Demand Seen for Fork Trucks and Stackers

F. J. Shepard Jr., treasurer, Lewis-Shepard Products Inc., Watertown, Mass.: "We look for continued interest in materials handling equipment from all types of industry. Power operated industrial fork trucks and stackers will be in especial demand as their use permits the utilization of total warehouse cubic space.

"A further urge to utilize materials handling equipment is the scarcity of common labor. With so few men available, each must be furnished with equipment to enable increasing his production. Figures of three to five times the ton mile equipment are not uncommon with proper selection of power driven trucks as compared with older accepted methods.

"Standard models serve the average user but we find increased interest in specially designed machines to fit the particular need. Standard subassemblies and parts are used wherever possible to hold costs at a minimum."

Outlook Promising for Electric Industrial Truck Industry

C. B. Cook, vice president, Elwell-Parker Electric Co., Cleveland: "The situation in which the electric industrial truck industry finds itself today is one which breeds optimism not only in the immediate future but in the distant future. Most concerns have ample volume of orders on hand, although buyers are becoming rather choosey. They continue to insist upon quality equipment, and they are not sacrificing too much for the sake of expediency or for the sake of quicker delivery. The backlog which most truck manufacturers are carrying today may continue as long as there is not much possibility of a recession. It would seem that for the next two or three years there is going to be ample business for all, and the tendency to raise the floor under common labor naturally broadens the market for handling equipment. In view of the fact that most power industrial trucks will repay their initial cost the first year, and on account of the cheap money available, the present market price of this equipment is entirely too low when compared with other equipment that may perform same function."

Trend Toward Standard Units Seen in Industrial Trucks

D. L. Darnell, vice president in charge of sales, Baker Industrial Truck Div., Baker-Raulang Co., Cleveland: "The most interesting developments in the industrial truck industry during the past year appear to be at opposite ends of the capacity scale. On one hand we have 60,000 pound ram trucks developed by some manufacturers to handle the heavy coils of strip steel now being processed in some mills. On the other hand we have fork trucks built in capacities as low as 1000 pounds and priced so low that they will appeal to users who have previously felt that they could not afford a power truck.

"These two machines are not only at opposite ends of the capacity scale but differ widely in another regard. The 6000-pound ram truck is a special machine built on order, but the 1000 pound fork truck is a production unit. There is a definite trend in the industrial truck industry toward the standardized production unit and away from special machines. Today's high material costs and higher labor costs make the special machine so expensive that most users find it more practical to adapt their handling operations where practical to standard, lower-priced units.

"Demand for industrial trucks was stepped up during the war period because of the necessity to augment hand power with machines whenever possible. That created an acceptance of material handling equipment which did not exist before the war. In addition we have the fact that today's economy makes it necessary to use all possible equipment for increasing the productivity of labor. In view of these factors it is expected that the market for power industrial trucks will hold up well into the future."

Materials Handling—Key Factor In Production Efficiency

Elmer F. Twyman, general manager, Automatic Transportation Co., Chicago: "Recent history of metalworking virtually parallels the development of materials handling methods. We of the materials handling industry are both proud and glad to know that recent developments in our industry, as well as those which will materialize in the immediate future, will contribute materially toward increasing the production efficiency of metalworking industries.

"Steel mills, for example, will be able to operate twice as long without shutdowns for rethreading, to prevent waste of motion, and to use the most efficient processing equipment as the result of new ram tractors now in production at this plant. These trucks—the new Skylift Giant series—range from 20,000 to 60,000 pounds in capacity. The largest models will handle eight 7500-pound coils of sheet steel welded together into a single coil, thus permitting mills to operate twice as long as previously without rethreading, eight times as long as prior to the first 15,000-pound capacity ram truck built in 1935.

"The movement of both raw and finished materials through the plant is the principal factor determining production efficiency today. To take advantage of the basic laws of material movement, plants must be built so as to utilize efficient handling equipment. Materials handling should never be superimposed as an afterthought.

"Larger equipment, however, does not represent the only progress made and about to be made in the field of materials handling in metalworking industries. This company, for example, is building special motorized hand trucks to move welding equipment quickly and easily about the

plant; fork trucks with special crane attachments for charging cupolas; and 30-ton die-handling platform trucks handling the largest dies ever constructed in the automotive and similar industries, with motorized loading and unloading pins to push the dies on and off the platform."

Electric Trucks Substitute For Plant Expansion

C. F. Kells, managing director, Electric Industrial Truck Assn., Long Island City, N. Y.: "Three of the factors that influence growing utilization of industrial trucks have been outstanding in 1947 and will probably continue to affect progress in mechanized handling of this type in 1948. The first is that electric trucking has become an advantageous alternate for plant and warehouse expansion. Furthermore the successes of battery-powered trucks in this service make them more than temporary substitutes. In the face of high costs of construction, inferior or unavailable building materials and supplies, and with the present uncertainties of industry as to where and how much building could be amortized in future operations, this has proved to be one of the year's most outstanding services of industrial lift trucks.

"The second factor, particularly in relation to fork trucks, is the mutual benefit that has grown out of widespread usage of palletized unit loads. Thus, if a company's principal suppliers can ship unit loads on pallets and if its larger customers can receive unit loads, the advantages of battery-truck handling by this company are greatly increased. In consequence many companies that use battery-trucks have recently been urging both their suppliers and customers to ship and receive palletized loads.

"The third factor in present battery-truck utilization is the fruit of 30 years of educating industry in the economics of these handling methods, plus the lessons of war-time service. The effectiveness of learning to do by doing is no better demonstrated than by the expanded utilization of industrial truck methods during the recent war."

Unusual Handling Flexibility Offered by Heavy Trailers

J. C. Farrell, president, Easton Car & Construction Co., Easton, Pa.: "Movement of heavy materials and machines by rail in intra-plant service is rapidly giving way to the advantages of speed and flexibility which can be provided with big trailers. One interesting slant on trailer haulage is the idea of portability. Pumps, generators, other types of machinery, storage tanks and even shipping platforms, mounted on wheels, have pointed the way to considerable savings in off-highway and intra-plant transportation.

"We expect that most big trailers for off-highway service will be custom-built to fit special requirements. Experience has shown us that the basic idea for application of big trailers usually comes from progressive minded plant operating men. Our job is to work out the engineering details, design and construction.

"However, over a period of time, it is logical to expect that some of the special designs can be standardized for wide application, vertically, through a particular industry."

Inefficient Materials Handling Boosts Product Prices

Wayne Beldon, vice president, Ajax Flexible Coupling Co. Inc., Westfield, New York: "Making a close-hauled forecast of manufacturing economies, it appears rather self-evident that two of the most potent sources of savings are in the nonproductive classifications of industry. Economies in plant and machinery maintenance and savings in materials handling are two wide-open fields for reducing nonprofit and overhead burdens.

"It should be unnecessary to enlarge upon the obvious, but the fact remains that pecuniary savings on accessory equipment can repeatedly shut down not only single machines but entire departments and, in fact, plants. It is in cases such as this that shutdown costs far outweigh the price of top quality equipment.

"Likewise, handling of bulk, semi-processed and finished materials by inefficient methods can add to selling prices on a basis of the arithmetical progression involved in figuring manufacturing, overhead and sales costs.

"It is our belief that in past and impending buyers' markets, it is good business to out-design, out-manufacture and out-save all along the line."

Greater Emphasis Placed On Materials Handling

F. E. Moore, president, Mathews Conveyer Co., Ellwood City, Pa.: "Probably more attention is being focused on materials-handling today than ever before. Every manufacturer is confronted with extremely high production costs, and must strive for methods which will keep his handling costs at the very minimum. These factors have resulted in great activity for conveying equipment manufacturers for both the light and heavy industries. Requirements for conveying equipment used in steel, brass, and aluminum producing and processing plants has been very heavy. This has likewise been true in the case of our larger steel, grey iron, and nonferrous foundries.

"The great amount of system work on the engineering boards of the conveyor manufacturers, indicates that activity is likely to continue through 1948, and somewhat beyond the close of the year. How much further, we would not hazard an estimate at this time. All things considered, and barring unforeseen uncontrollable events, it looks like a very busy year for the materials-handling people."

Internal Handling Costs Exceed External Transportation Tariffs

Ezra W. Clark, consultant on production and merchandising problems, Battle Creek, Mich.: "It costs more to move a ton of steel through a metal-working plant in the process of production than it does

to bring the ton of steel from the Pittsburgh area to the middle western plant; i.e., the cost of internal transportation. This is not a theory but a fact proved by actual surveys.

"Metal-working management has been quick to appropriate and use material handling methods developed during the war, such as fork trucks, unitized pallet loads, and the power operated hand lift truck known as the Transporter. Equally as important although not as apparent is the increased efficiency of portable conveyors, caster wheeled dollies, and antifriction bearing, rolling platform and skids which are also shaving costs off of metal-working production.

"Twenty years ago, the pallet steel-taped unit package load came into being and now a progressive manufacturer has developed a mechanism by which the fork truck performs the same function without a pallet.

"All of these new material handling methods contributing toward the reduction of metal-working costs bear silent testimony to the creed of the material handling engineer: 'Unskilled labor adds nothing to a product except cost.'"

Difficult Handling Operations Demand Special Accessories

Lester M. Sears, president, Towmotor Corp., Cleveland: "Recognizing the importance of efficient materials handling and well aware that the metalworking industry faces many unusual and difficult handling problems peculiar to the industry, we have devoted a major portion of our research and engineering facilities to the development of handling equipment designed specifically for use in this industry.

"In certain instances, special accessories have been developed to meet the requirements of a particularly difficult application. One of these developments is a furnace-charging accessory, which includes a double set of forks, operated singly or together, by means of which the lift truck operator can place two full loads of castings in the heat treat furnace at one time. A special windshield protects the operator from the heat and glare of the furnace and tire guards over the front wheels protect the tires from the heat. Another development is a side-shifter unloader accessory, which permits accurate spotting of unit loads without repositioning the truck itself and removes the unit load from the forks with a single pushing motion.

"In addition other engineering developments still in the formative stage, are helping to provide, for the metalworking industry, the benefits of modern, efficient materials handling methods which, in turn, provide increased production efficiency at lower cost."

Conductor Enclosures Available For Existing Overhead Systems

A. F. Anjeskey, sales manager, Cleveland Tramrail, division of Cleveland Crane & Engineering Co., Wickliffe, O.: "Six or seven years ago we recognized the possibility that overhead equipment of our type on installations electrically operated would have to be provided with enclosures for conductors mounted along the rail to protect workmen against accidental contact with such live conductors. One of the problems in designing enclosures for conductors on track equipment lies in the fact that such enclosures must be compact and be capable of installation on existing systems, some of which have been in operation for over twenty years.

"We believe that progress in designing such safety conductors has reached a point where it can now be offered for limited sale on particular projects. This enclosed conductor bar system consists of an aluminum section covered with a rubber enclosure and suitably mounted on the track system. Power to operate the electrical equipment is taken off the conductor bars by enclosed copper collector wheels. The basic design has been under constant test on actual installations for over five years with very satisfactory operating results.

"However, due to the increased cost of such electrification, judgment must be used in its application, and installations should not be mandatory insofar as regulations are concerned except under conditions where a definite hazard to operators is present."

Industrial Trucks Major Factor In Mechanized Handling

C. E. Eller, president, Crescent Truck Co., Lebanon, Pa.: "Mechanical materials handling has developed into one of the foremost advancements in modern production, and the industrial truck is a major factor in this mechanized handling.

"Builders of electric industrial trucks, pioneers in the development of this modern method of materials handling, have within the past year presented many new and improved features to their already highly efficient equipment. They have also developed new models, conpactly designed, electrically powered, with fool-proof controls, providing fume-free, non-fire hazard service, in congested areas, food industries and warehouses where heretofore, this kind of equipment could only be operated in limited service.

"There are further new developments in the proving state, such as hydraulic drives; electronic controls; revolutionary battery construction, and many others, all of which will still greatly increase the utility o the industrial truck; the modern materials handling method."

"Push-Button" Handling Is Contemplated by Industry

Jervis C. Webb, treasurer and assistant to president, Jervis B. Webb Co., Detroit: "War needs are over and the bulk of plant reconversion is completed; however, material handling equipment sales are still rising. This is due to the following reasons: Manufacturers know that they must help employees to earn the high wages paid by mechanization. Competent handling engineers concentrated in a few industries before the war were, by the war, dispersed into every cranny of the industrial world. Industries

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who never used material handling equipment were forced to use it during the war to meet production demands, and saw first hand its possibilities. The realm of push-button handling in manufacturing is being contemplated in the automotive, household appliance and allied industries, where material handling of advanced types have always been studied. Finally, the material handling industry has developed many interesting designs and systems calculated to permit partial mechanization of handling in new industries, with low cost means to increase or decrease this trend without interfering with the manufacturers present methods."

Trend Toward Larger Blast Furnace Scale Cars

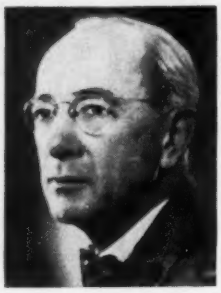
E. W. Schellentrager, vice president, Atlas Car & Mfg. Co.: "During the past year there has been a decided trend toward larger and heavier scale cars for filling blast furnaces. Three cars of 40 tons capacity have been built and several additional cars are on order. New orders being received indicate a decided preference for these larger cars.

"Another interesting tendency has been greatly accentuated during the past year, this being the use of rolled steel plates of special composition for the bottoms of coke quenching cars in place of the cast plates customarily employed. Indications are that the rolled plates provide longer life with less maintenance.

"There has been a marked increase in the use of self-propelled self-contained battery operated transfer cars for steel mill service. These are being quite generally used for handling long bars, pipes and tubing and similar products, and because these cars are absolutely safe in operation and cannot move faster than a slow walk, and have only one handle which controls the operation, they have been found eminently safe and satisfactory for steel plant operation. These cars generally include self-contained automatic battery charging equipment so that the battery can be charged at any point in the plant from the regular power lines and thus the cars can be kept in service 24 hours a day. A very interesting extension of this idea is the use of one of these battery operated cars for transferring heavy coils of strip steel. A 135-ton capacity car is now being manufactured."

Battery Maintenance Necessary For Best Plant-Truck Output

George E. Stringfellow, vice president and division manager, storage battery division, Thomas A. Edison Inc., West Orange, N. J.: "The steel industry not only utilizes a greater number of battery-industrial trucks than any other in the United States but, on an average, the trucks are of greater lifting capacity than those used in any other American industry. The fact that production of steel is virtually a continuous process means that industrial trucks which serve the production lines must likewise be capable of continuous, dependable operation.



"In order to achieve 24-hour-a-day operation with the high degree of dependability required, batteries are selected to provide adequate power for a full shift of continuous work and exchanged at the end of the shift. Two batteries may be assigned to the truck and exchanged at 12-hour intervals or three batteries may be used and exchanged at eight-hour intervals. In either case the trucks need to be withdrawn from service for only a few minutes each day and, following the installation of a freshly charged battery, they afford a full shift of operation without further attention. While the freshly charged battery is powering the truck the discharged battery receives the only daily attention required—watering and charging.

"Realizing that a breakdown in the handling system can seriously disrupt production, the steel industry has always been aware of the necessity for good battery maintenance. Facilities and methods of performing the three daily requirements — exchanging, watering and charging—have been greatly simplified. Battery rooms are laid out to provide complete overhead power hoist coverage. Many installations are equipped with a water still, reservoir and piping system to conduct distilled water to outlets on the charging benches where watering is done by means of electric filling outfits. Charging benches have been constructed to provide maximum ventilation and, in locations where high ambient temperatures are a factor, forced ventilation is provided for cooling before and during charging. Automatic charging equipment has been generally adopted throughout the industry.

"Remarkable service records which battery-industrial trucks have established in the steel industry may be attributed to the high maintenance standards to which the owners adhere."

Power Controls Add Flexibility To Heavy Handling Machinery

Fred L. White, chief engineer, The Osgood Co., Marion, O.: "Probably the most revolutionary development in heavy materials handling and excavating machinery since the advent of the internal combustion engine operated machine, has been the adoption of power control of the operating motions. By the use of pneumatic or hydraulic controls of clutches and brakes, operating speeds of such machines have been greatly increased, in many cases as much as 25 per cent, with much less fatigue, and consequently greater efficiency of the operator.

"As more operators become acquainted with the ease of operation of such machines, as compared with the manually controlled machines, they will no doubt create a sufficient demand for power controls that all such machinery eventually will be provided by the manufacturers with some form of power operated controls.

"Clutches, valves, etc., have been designed which give accurate and precise control of the clutches and brakes, and which give the 'feel' of manually controlled motions without the attendant back-breaking labor. No other single development on this class of machinery, of such importance has been made in a great many years."

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As operating conditions vary in the different plants of the chemical and processing industries, and the durability of a casting often depends on the type of process in use, it is not always possible to recommend the most suitable analysis for every specific use by any set rule. Therefore, orders or requests for quotations should include as much information as possible.

We invite you to discuss your specific problems with our metallurgists and service engineers.

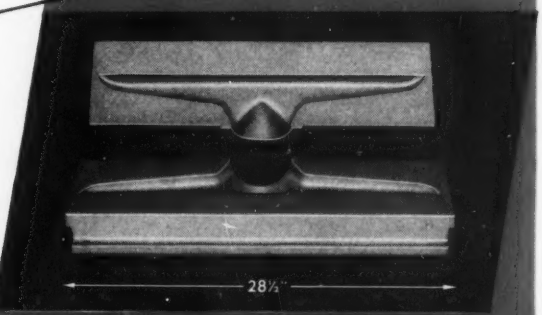

Fig. 1 Extrusion nozzle used in Plastic Industry, cast-to-shape from JESSOP Heat Resisting Steel.

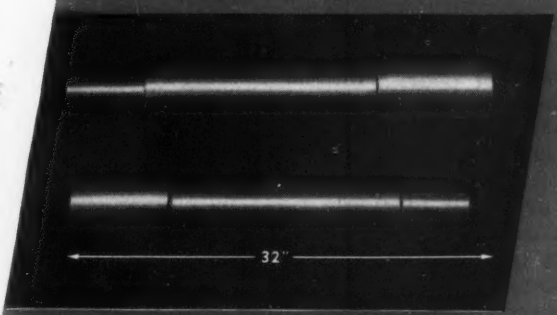

Fig. 2 Cast-to-shape valve stems for accumulator, made from JESSOP Corrosion Resisting Steel.

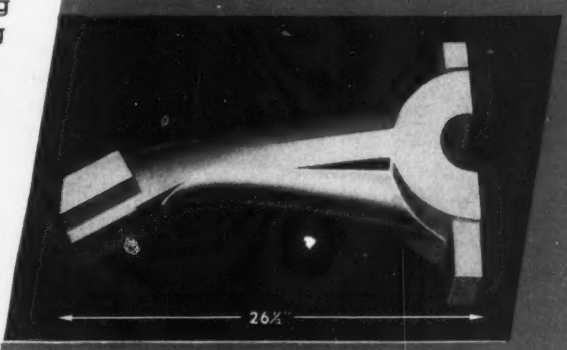

Fig. 3 Scraper arm for mixing chemicals, cast-to-shape from JESSOP Acid Resisting Steel.

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JESSOP STEEL COMPANY

WASHINGTON, PENNSYLVANIA

Metal Production

Cold charging still bottleneck in most open-hearth plants. . . Coal washing facilities may ease critical coke problem. . . Engineers concentrate on merchant mill refinements. . . Furnace delays curtailed by new refractories

New Developments in Lead Hindered by Heavy Demands

Robert L. Ziegfeld, acting secretary, Lead Industries Association, New York: "New developments in lead have not been remarkable during the past year, probably largely due to the fact that the supplies of lead were only just able to take care of regular demands. This situation has naturally not encouraged new developments. However, there have been some developments which may be of consequence.

"The U. S. Forest Products Laboratory has developed a method of dimensionally stabilizing dry wood by immersing the wood in a low melting lead alloy bath. A new patent covers a method of flame proofing fabric by impregnating the fabric with a silicate glass of lead.

"In several instances, lead bends or stubs, which are used to connect water closets to soil stacks, have been supplied with one end spun closed in the factory. This permits testing of the piping installation without the need of the bend or stub being soldered closed by hand on the job.

"Considerable progress has been made in the development of mixed pigment-red lead paint formulations to meet special conditions of cost, application, etc. A new type of lead pigment consisting of a silica core with a surface layer of lead sulphate and lead silicate has been described during the year.

"During 1947, considerable attention has continued to be given to the use of lead for protection against radioactive materials. It has resulted in a number of special designs of interlocking lead bricks for the erection of movable barriers to rays; development of special types of containers for transporting radioactive materials, including revised Interstate Commerce Commission regulations governing such containers; and in various methods of combining the low cost of concrete barriers with the space and weight saving of lead barriers for large immobile installations, even to the extent of investigating the possibilities of combining lead concentrates or lead minerals in the concrete aggregate."

War Materials and Processes Find Many Civilian Uses

L. W. Townsend, manager, composite steel division, Jessop Steel Co., Washington, Pa.: "Heretofore, on several occasions, plans to make stainless clad steel available in lighter gages and in large quantities, were published in various periodicals. These culminated during 1947 into a working agreement between Alan Wood Steel Co., and Jessop Steel Co., which will make available to industry during 1948, 1500 tons a month or more of this product.

"This development, in conjunction with the refinement of means of surface finishing, will lead to a wide use of stainless clad steel in various stampings to be used in transportation, food and architectural industries. Electrolytic polishing of stainless steel will make great strides during 1948. A combination of this finishing process and stainless clad steel will lead to great economic advantages in conjunction with the use of stainless clad steel to produce sections of better design, beauty and lasting qualities.

"Stainless clad steel made by the Armstrong process in sheet gages became commercially available in large quantities approximately the beginning of September, and the interest developed throughout the country has made it necessary to plan even greater production capacity to keep up with the trend towards the use of this high quality composite steel."

Service Conditions Accelerate Trend to Basic Refractories

R. E. Birch, director of research, Harbison-Walker Refractories Co., Pittsburgh: "In the open-hearth, steel furnace refractories problems are centering around the greater severity of the operating conditions resulting from the production push and the possibly revolutionary experiments with oxygen for combustion and bath lancings. The excellent movies which have been taken of the oxygen experiments show that roof brick for the first time may be subjected to a splash or rain of droplets of open-hearth slag. Thus the contaminant available for eroding the brick is no longer only iron oxide but may contain much lime as well as manganese (from the metal) and other constituents of the slag. This might seem to call for altogether different refractories.

"Actually, however, it is likely that the solution is to be found in refractories already available. These include the superduty silica brick which may be used to temperatures about 75° F higher than can the normal silica brick, and also basic refractories. At least one plant has found it advantageous to raise the level of the roof to take the refractories farther away from the erupting slag.

"The trend to basic refractories for greater use in the open-hearth superstructure is accelerated by present service conditions. Their use in the open-hearth roof is approaching the

UMBER **13** IN A SERIES OUTLINING McKEE SERVICES TO THE IRON AND STEEL INDUSTRY IN RECENT YEARS

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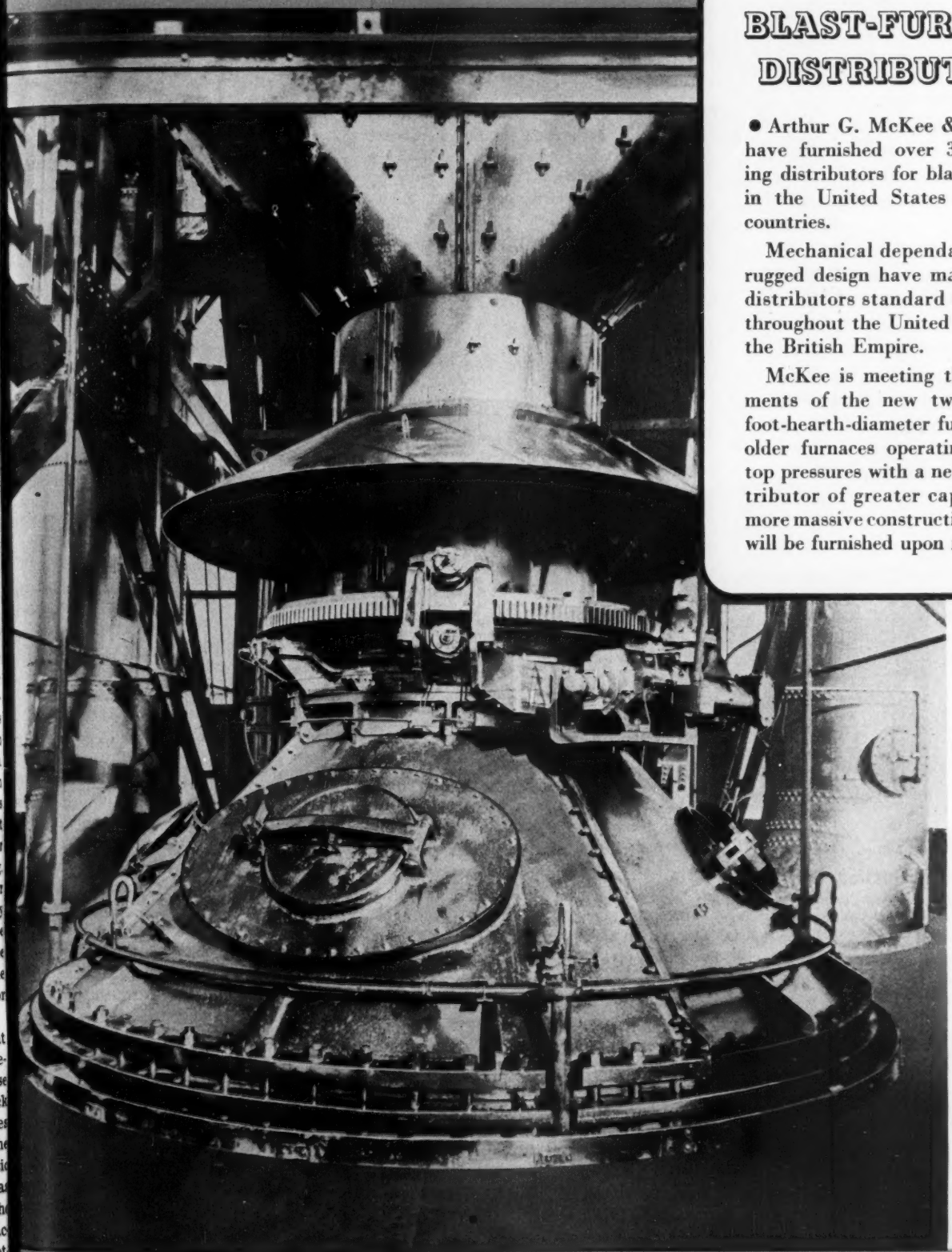
Mechanical dependability and rugged design have made McKee distributors standard equipment throughout the United States and the British Empire.

McKee is meeting the requirements of the new twenty-eight-foot-hearth-diameter furnaces and older furnaces operating at high top pressures with a new type distributor of greater capacity and more massive construction. Details will be furnished upon request.



This McKee distributor, shown during installation, operated continuously from Pearl Harbor until this year.

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breaking even point on economy as compared with silica refractories whose initial cost is far less. This represents great technical progress from which further advances will be made."

Suspended Roof Designed To Conserve Heat

L. C. Hewitt, vice president and director of research, Laclede-Christy Clay Products Co., St. Louis: "Producers of refractories have, with great interest, followed such developments in steelmaking as the use of basic endwalls and partial or complete basic roofs in open-hearth furnaces, the increasing use of oxygen and other developments which are likely to influence the demand for refractory products.

"New designs for suspension of furnace roofs have been developed which promise to aid in conserving heat as well as in extending the use of higher grade refractories. In blast furnaces the use of fire clay refractories fired at higher temperatures than heretofore, combined with carbon bottoms, promise to give even longer life than has been obtained in some of the record-breaking furnaces in the past."

Copper and Brass Industry Uses High Production Unit

D. K. Crampton, director of research, Chase Brass & Copper Co. Inc., Waterbury, Conn.: "In the copper and brass industry there have been no outstanding new alloys developed during the year 1947. However, it is noted that an increasing use of some of the relatively newer alloys continues. These include chromium copper, tellurium-bearing alloys, nickel phosphide bronzes and inhibited admiralty and aluminum brass.

"There is a marked trend toward high production units in various mills. In sheet and strip production for instance, both the hot and cold breakdown of wide, heavy cast cakes and bars continues. Both single and tandem 4-high rundown mills are used increasingly to bring metal about 24 inches wide down to quite thin gages before slitting.

"In tube mills there is greatly increased use of multiple high-speed drawbenches, usually direct current driven so as to take advantage of a slow start and subsequent stepping up of speed thereafter. Multiple drawbenches and high-speed bull blocks and wire drawing machines are also finding increased use in rod and wire mills."

Aluminum Only Metal Cheaper Today Than Before the War

David P. Reynolds, vice president, Reynolds Metals Co., Louisville: "Aluminum in 1947 made its appearance in more products in more places to serve more people than ever before. Two important examples are duct work and building materials—chiefly roofing and siding.

"During 1947, millions of pounds of aluminum were used for duct work. Enormous amounts were consumed for sheet roofing and siding. Extensive promotion programs on the part of manufacturers brought aluminum to the favorable attention of many designers in other fields. As a result, possibilities of the metal are being studied by more product manufacturers. Most significant development among the new users is that most of them say they will continue to use aluminum even when other metals become readily available.

"While composite price of other metals increased more than 100 per cent since 1939, base price of aluminum decreased 30 per cent, making the metal more competitive than previously. In fact, introduction of a new aluminum alloy in sheet form especially designed for sheet metal work at approximately 22c per pound now makes aluminum directly competitive with other common metals at 7 1/3c per pound due to the 3 to 1 weight ratio. Aluminum is the only basic material that is cheaper today than before the war.

"Past year also saw enormous amounts of this light metal consumed by the automotive industry. While use of aluminum in passenger cars previously averaged something like 10 pounds per car, 1947 saw this average rise to around 20 to 30. The trend is rising sharply with 100 pounds per car within the realm of possibility for 1948. For 5 million cars, that would mean production of a half-billion pounds of aluminum for this single application."

Economic Use of Heat Faces Blast Furnace Operators

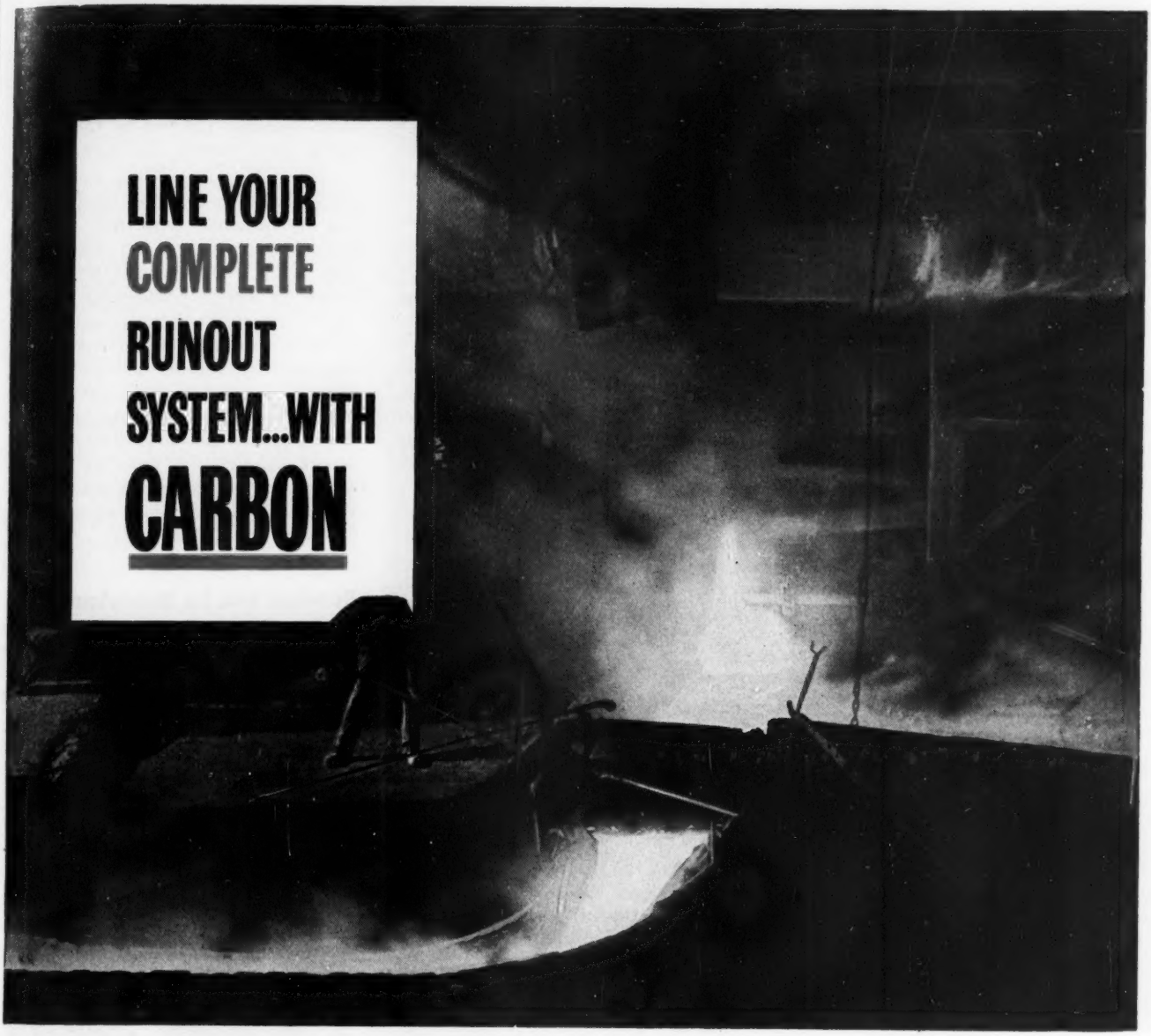
Charles E. Agnew, consultant, blast furnace and sintering plant operations, Cleveland: "Conditions which are developing in the raw material supply for the iron blast furnace industry of the United States places the industry on the threshold of a new era in operating practice methods.

"In every blast furnace operation raw material cost is the major item of pig iron production cost, and fuel cost is always a substantial part of the total raw material cost. In recent years the unit cost of furnace-delivered fuel has increased at a more rapid rate than the unit cost of other raw materials, therefore, the efficiency and economy with which heat generated from the fuel is used is of proportionately greater importance to the furnace commercial economy than it has ever been in the past. Heat is a form of energy, but in a study of blast furnace operating economy it should be considered as a commodity.

"Since there is nothing to indicate a prospective reduction in the unit cost of blast furnace fuel the only opportunity for lowering the monetary cost of heat consumed in the furnace operation lies in reducing the volume of heat consumed in the production of a unit of iron and in increasing the percentage of recovery and use of latent heat (CO) normally taken from the furnace with the top gas.

"The theoretical minimum volume of heat required to produce a unit of iron is always determined by the thermal requirements for smelting the raw materials used but thermal efficiency and thermal economy in the smelting is determined by the thermal effects created within the furnace by the character of the raw materials used and the operating practice method which is used with them.

"Control of thermal effects within the furnace is governed by combining



● "National" carbon-block linings have for years been doing a fine job in blast furnace runout troughs —between taphole and skimmer plate.

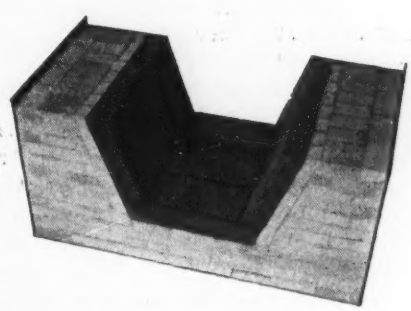
Why stop there?

Why not use carbon linings for the entire system, from furnace to ladle, and in the lead-in spouts of the pig machine as well? Carbon-block construction, shown at right, is recommended to the skimmer plate. Carbon bricks are most practical for the rest of the troughs.

Why use carbon?

Carbon outlasts other trough linings by months, even years. It is unaffected by thermal shock. Hot metal will not stick to carbon; so, if any skull is formed in the trough, it is readily removed. Furthermore, if you desulphurize in the trough, you'll find that carbon is highly resistant to desulphurizing agents.

Here is the recommended construction for a carbon-block trough between taphole and skimmer plate. Dark section is carbon. Light section is firebrick.



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a selection of natural raw materials having a preferred character, and/or beneficiation of low-grade materials to a preferred character, with an operating practice method suitable to the character.

"Because of the rapid depletion of both naturally rich iron ores and the better grades of coking coal, efficient and economical use of heat appears to be the major operating and economic problem facing the blast furnace industry of the United States. The problem should not be looked upon as an economic evil but rather as an opportunity for improvement in the art of producing metallic iron, comparable in scope to the improvement which followed the use of bituminous coke for blast furnace fuel."

Wide Use for Stainless Clad Steel Is Predicted

John R. Townsend, materials engineer, Bell Telephone Laboratories Inc., New York: "Outstanding accomplishments of the last year have been in the field of industrial peacetime applications of new materials and processes originally developed as part of the war program but now released for civilian use. For this reason, much of the work which appears to be outstanding this year is in reality only a continuation of work started previously but now beginning to receive more public attention.

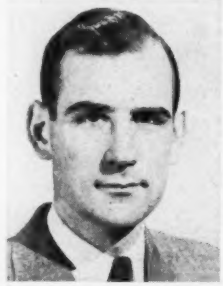
"Among these processes, one which seems particularly worthy of note is the expanding use of circuit printing in the manufacture of small radios and other electronic equipment. This development is important because of the great saving in man hours and tin. Other important developments were machines for the inert arc welding of aluminum, particularly in portable form, and powder metal oxyacetylene machines for hard surfacing and for the cutting of austenitic steels.

"Use of oxygen in the steel blast furnace and, to a lesser extent, in the open hearth to reduce the time required for the production of pig iron and the manufacture of steel should not be overlooked. The addition of zirconium to magnesium alloys to increase their cold working characteristics, to increase the soundness of sand castings and to facilitate forging, is of considerable value.

"Another outstanding development has been the use of aluminum for home wiring, for roofing, and for siding in home construction. Not to be overlooked, is the development of methods for recovering high-grade aluminum from war-time scrap."

Stainless Producers Find Powder-Cutting Process Versatile Tool

D. H. Fleming Jr., development engineer, The Linde Air Products Co., New York: "Stainless steel producers and fabricators have found the powder - cutting process a versatile tool with a steadily expanding field of application. Thickness limitations of the process have not been defined, but one large steel foundry is currently powder-cutting 44-inch thick risers from stainless steel castings on a production basis.



"During the past year studies were completed on the effect of powder-cutting on the cut edge. These tests showed that the heat effect of powder-cutting on unstabilized stainless steels was no more severe than the heat effect produced by welding. In both instances the heat effect was eliminated by a post-annealing treatment. Further studies showed that a low-velocity water quench directed on the kerf a short distance behind the cutting nozzle appeared to eliminate the heat-affected zone in thicknesses up to 1/2-in. and reduced the zone in plate of greater thickness."

Operates Modern Laboratory For Testing Fire Clay

Britton T. Day, sales manager, American Fire Clay & Products Co., Cleveland: "The fire clay industry has come to realize with the building of larger heating furnaces and larger open hearths that the old-fashion operation of clay pits, grinding and screening is not good enough for present-day needs.

"The American company is one of the first fire clay companies to put in operation a complete up-to-date ceramic laboratory. This has been operating for over three months and through careful testing and checking a definite procedure is employed to keep fire clay of uniform quality and sizing. This has helped in the practical results obtained for use in blast furnaces, open hearths and ladles.

"Soon a long range program will be inaugurated to improve results that can be obtained with fire clay in various applications and while this may mean adding certain other materials in correct proportions according to the physical characteristics of fire clay we believe better results and less troubles will be obtained. Even though a number of different fire clays have a similar chemical analysis their physical characteristics are different and yet they have an important bearing on the results that can be obtained in blast and open-hearth furnaces and ladles."

Develops Gun for Maintenance Of Brickwork Above Slag Line

Harvey N. Barrett, manager of sales development, Basic Refractories Inc., Cleveland: "During the year just closed the BRI gun and Gunchrome were introduced to the steel industry as valuable tools for the maintenance of furnace brickwork above the slag line. The gun is the culmination of more than five years of test and development work and its construction embraces knowledge gained from three earlier models.

"Gunchrome consists essentially of chrome ore and is not limited in application by the chemical nature of the refractory brickwork to be repaired. It can be used to maintain either acid or basic refractory construction. The product is being used to fettle backwalls, skewbacks, frontwalls, uptakes, monkeywalls, ports, and burner housings. As a matter of fact, some operators with characteristic enterprise are literally rebuilding furnaces without suspending operations by using this refractory through the gun to replace large sections of eroded furnace superstructure.

"In most instances the operation of the gun is made the responsibility of a special gun crew. This practice insures the skilled handling of the

equipment and eliminates gun breakdowns which sometimes occur when responsibility for its care is not specifically assigned. The gun and special refractories prove helpful in prolonging furnace life under the severe conditions imposed by the increasing use of oxygen.

"Use of air emplacement will not be limited to special refractories but may at some future date be extended to provide a new and more efficient method of placing hearth fettling and maintenance refractories."

Advancements To Refine Production of Magnesium Alloys

Charles E. Nelson, technical director, magnesium division, Dow Chemical Co., Midland, Mich.: "Development work on special-purpose magnesium alloys is in a semi-plant stage, with service experience being gathered in various aircraft frame and engine applications. These alloys contain elements, for example, zirconium and cerium, not now being commercially used in this country.

"A new top-pouring slot gate has been developed for magnesium alloy castings which facilitates the production of sound castings and also improves the foundry yield (casting weight divided by poured weight).

Commercial production of magnesium alloy sheet has gone over completely to rolling of cast slabs. Highly successful large-scale rolling experiments have been carried out on continuous mills with 2000-pound slabs.

The development of superimposed high frequency alternating current welding using the inert gas shielded method has made practical the welding of heavy magnesium plate or extrusions.

"A brazing process for magnesium has been developed and is already in limited production use. The method can be adapted to furnace, local heating or flux dip methods.

"A new electroplating process for magnesium is just completing pilot plant evaluation and will permit plating with copper, nickel, chromium materials.

"Interesting new uses are piano action parts, piano plates, furniture, dock boards and in the printing field —photoengraving. Of special interest is the newly announced process whereby whole pages of newspapers are printed from one single magnesium alloy plate."

Concrete Reinforced Steel Advocated for Buildings

Arthur A. Schwartz, tool consultant, Buffalo: "Steel has been, is, and will always be, the backbone of our modern mechanized civilization. Although our present supply of high grade ores would tend to increase the price of steel, technical progress and perhaps cheap oxygen keeps the price of steel in line.

"In our housing shortage we have not made progress in keeping with other products. Steel reenforced concrete has not proved a boon to the house builders. But concrete reenforced prefabricated steel units in sizes suitable for private home building will be a real boon.

"We say concrete reenforced steel because that most accurately describes it. Light steel wall panels of say 4 x 4 feet could have stiffness and weight-carrying capacity added by concrete applied either at their origin or cast in place after erection. This would make a building, that with the use of steel or other metal doors, windows, frames, and trim, would be as nearly fire-proof as it is possible to make."

High Purity Silica Brick Gives Increased Service Life

S. M. Swain, director of research, North American Refractories Co., Cleveland: Continuation of high operating rates of open-hearth furnaces has kept active the interest in silica brick of high purity. While there have been discussions and disagreements concerning the role played by the individual oxides, it is generally agreed that brick of high purity give marked increase in service life.

"Similarly, superior silica morters of equally high refractories have found increased application. High refractories and excellent working characteristics of these products have permitted their use under the most severe service conditions and have added to the increase in life of roofs and other parts of furnaces.

"Studies of analyses of pure silica brick show that extreme care must be taken both in preparation of samples and in procedure of the determinations. Grinding of the sample is particularly important.

"Operators of open-hearth furnaces, blast furnaces, gas machines, and glass tanks have been paying increased attention to service conditions encountered in checker chambers and properties of checker brick. Extensive surveys have been carried out to determine the exact service conditions to be met and the variation in such conditions with changes in operating rates and schedules. Results from such studies have permitted refractories manufacturers to carry out tests for improvement and for better evaluation of checker brick."

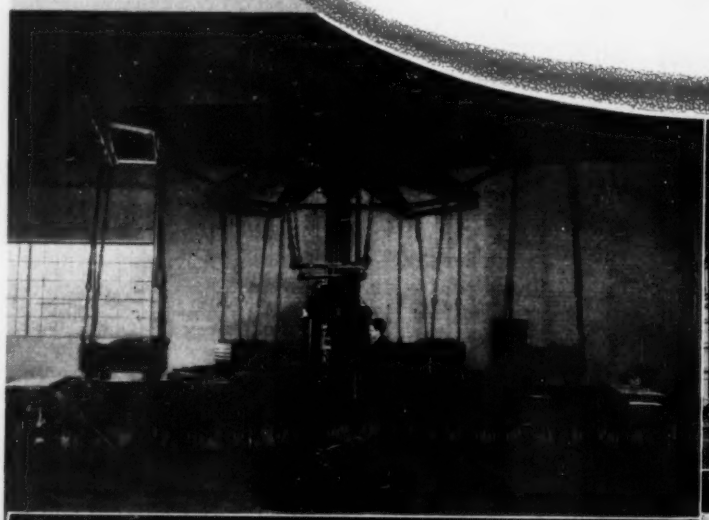
High-Pressure Blowing Effects Reduction in Coke Rate

Ralph H. Sweetser, consultant in blast furnace practice, New York: "A most remarkable achievement in blast furnace practice during 1947 was the completion of the tests on the high-pressure DPC furnace, Republic Steel Corp., Cleveland. Among the many efforts to increase the pig iron production during the World War II was the proposal of Arthur D. Little Inc. to use the process patented by Julian M. Avery. In reference to this patent it is interesting to recall that the plan to increase the top gas pressure of a blast furnace by several pounds was seemingly preposterous when we had been trying for years to keep the top pressures low so as to avoid flue dust losses.

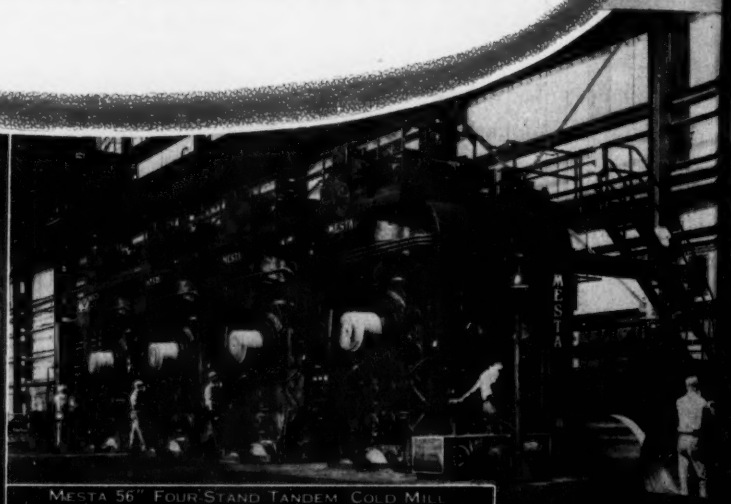
"It took a forward-looking management and a brave operating staff to agree to undertake such an uncertain experiment with such a costly, volcanic piece of apparatus as a modern 107-foot blast furnace. The results as reported by J. H. Slater, Assistant District Manager, Cleveland District, Republic Steel Corp. fully justify all the risks and expenses, and proved that the capacity of an iron blast furnace depends on how much coke can be burned at the tuyeres without the bad results of 'over-blowing'. The 90,000 cfm. of wind blown at this furnace would fill its working volume (44,346 cu. ft.) twice every minute and with some to spare. This is a tremendous amount of hot blast to be responsi-

DESIGNERS and BUILDERS of COMPLETE STEEL

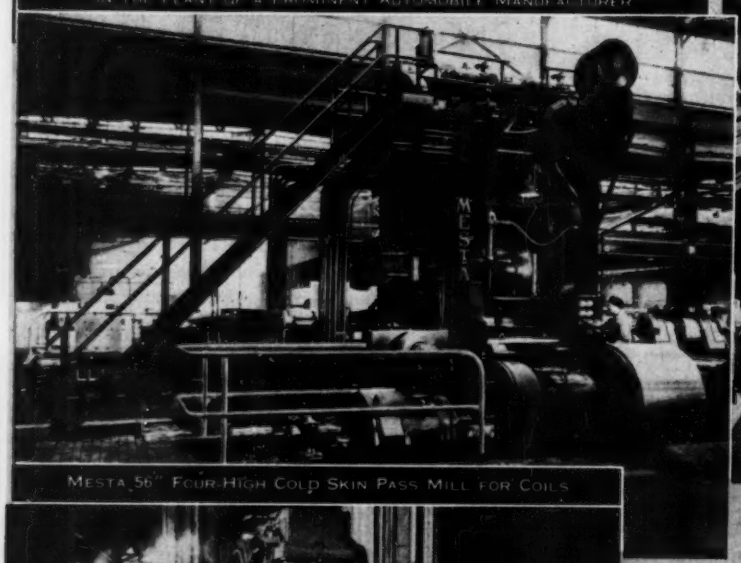
MESTA



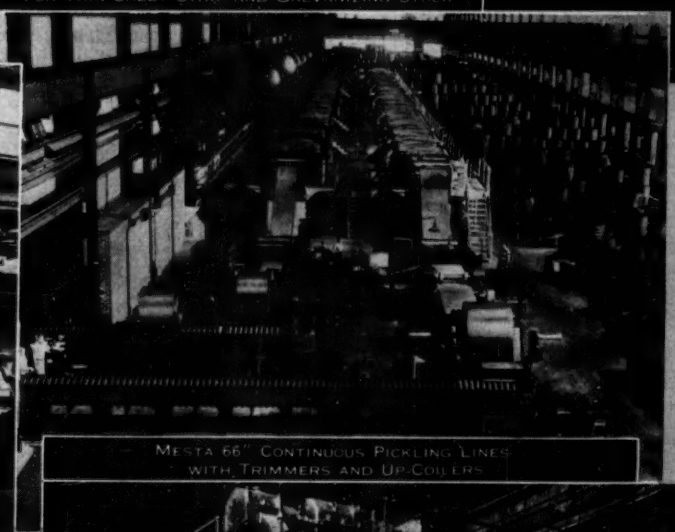
MESTA 32" PATENTED PICKLING MACHINE PROCESSING DROP FORGINGS IN THE PLANT OF A PROMINENT AUTOMOBILE MANUFACTURER



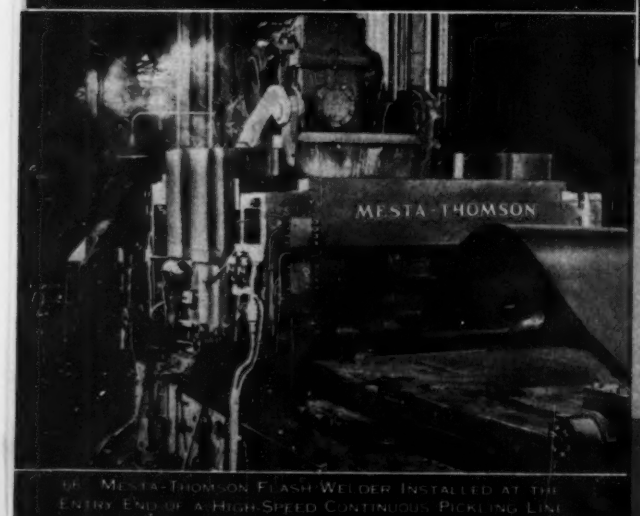
MESTA 56" FOUR-STAND TANDEM COLD MILL FOR THIN SHEET STRIP AND GALVANIZING STOCK



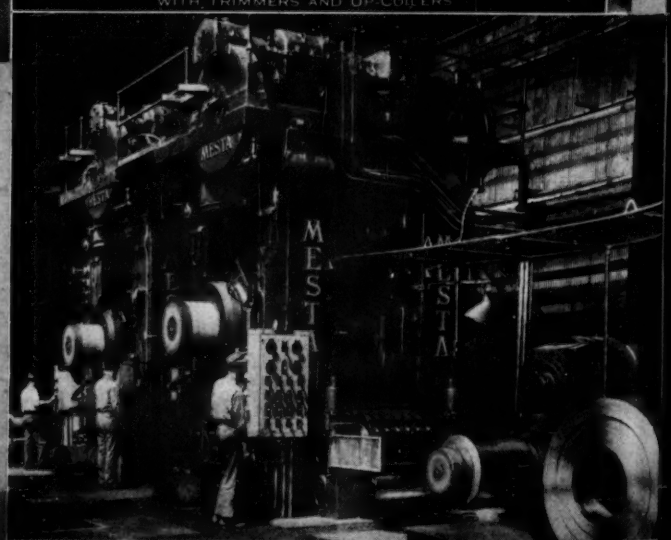
MESTA 56" FOUR-HIGH COLD SKIN PASS MILL FOR COILS



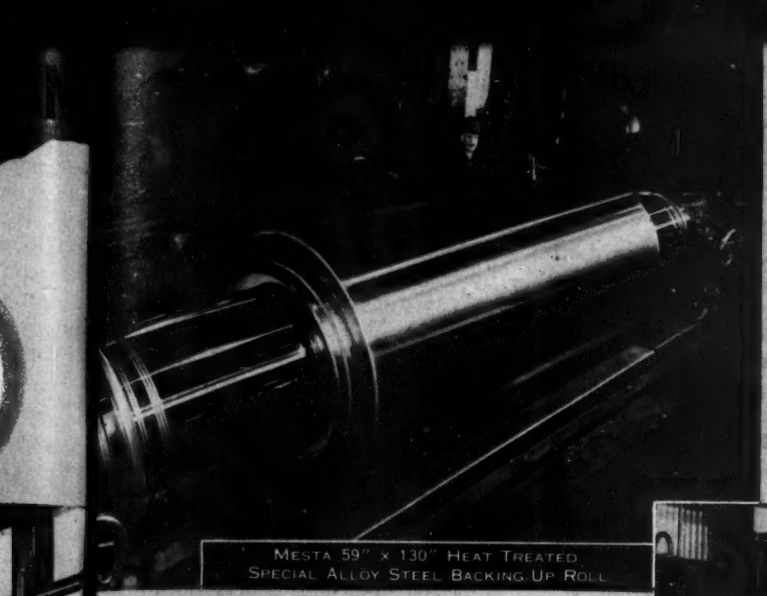
MESTA 66" CONTINUOUS PICKLING LINES WITH TRIMMERS AND UP-COILERS



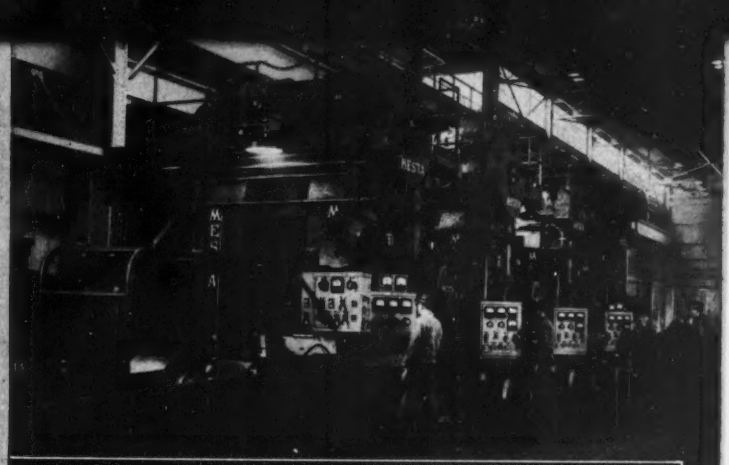
MESTA-THOMSON FLASH WELDER INSTALLED AT THE ENTRY END OF A HIGH-SPEED CONTINUOUS PICKLING LINE



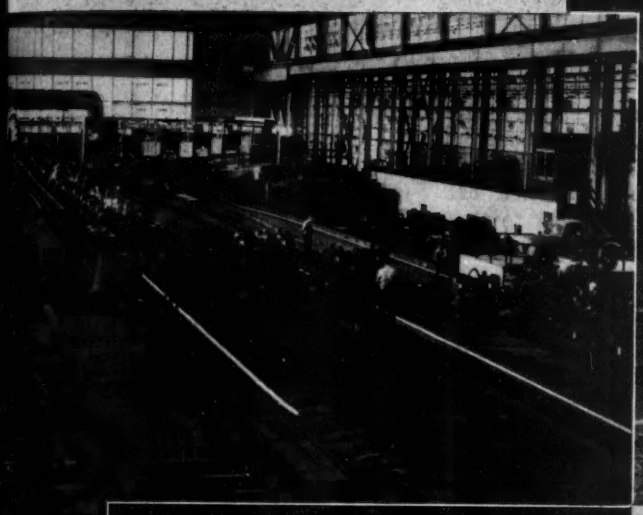
MESTA 42" TWIN HIGH-SPEED FOUR-HIGH COLD SKIN PASS MILL



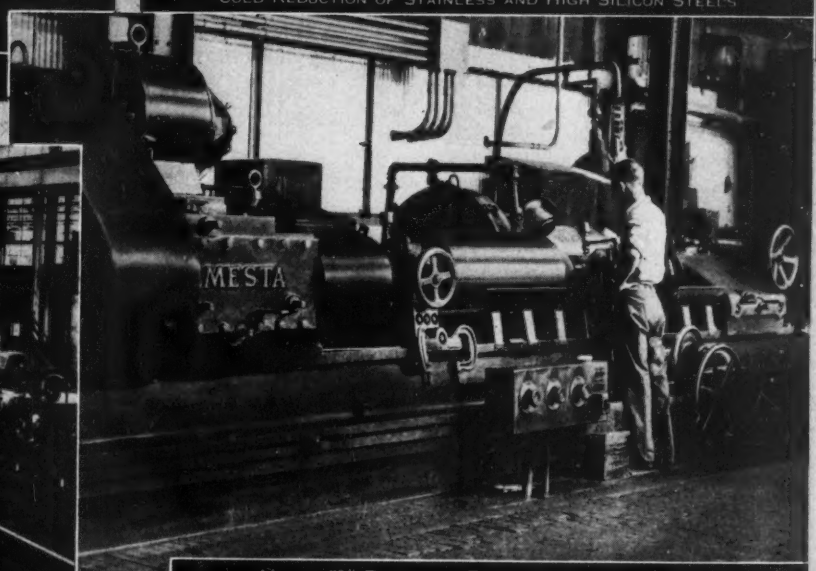
MESTA 59" x 130" HEAT TREATED SPECIAL ALLOY STEEL BACKING UP ROLL



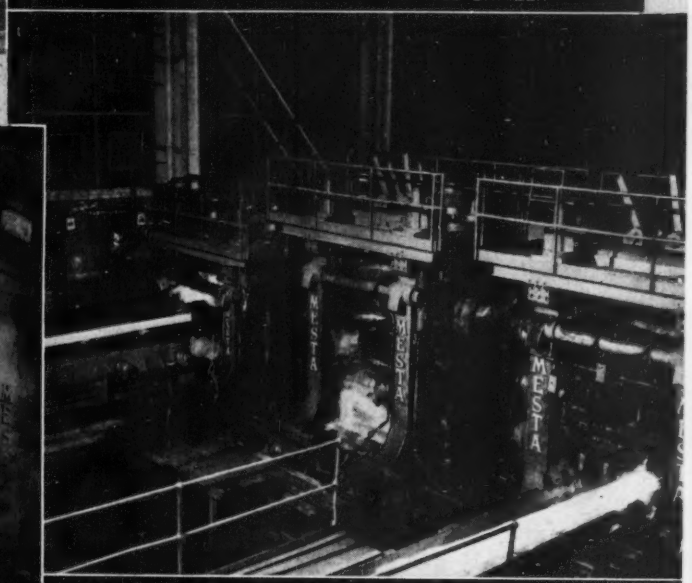
MESTA 28" FOUR-STAND TANDEM MILL FOR THE COLD REDUCTION OF STAINLESS AND HIGH SILICON STEELS



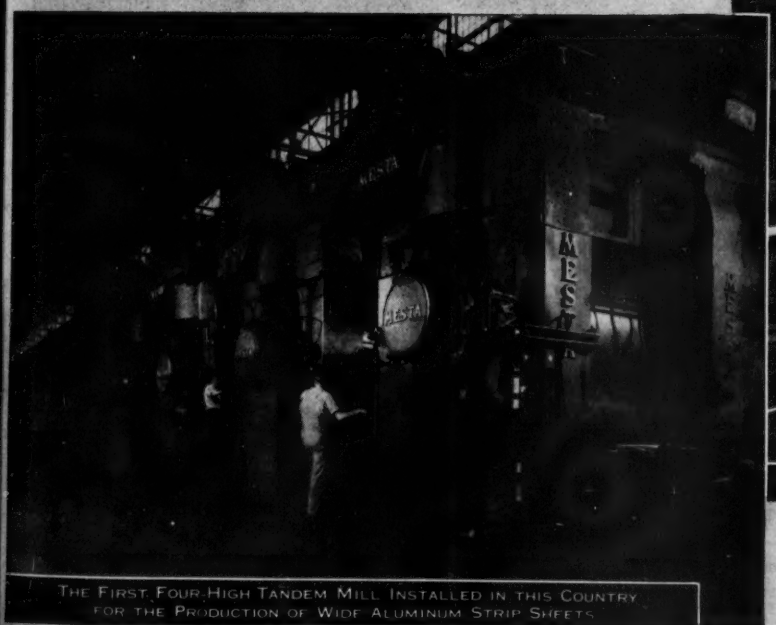
MESTA 18" - 14" - 10" MERCHANT MILL



MESTA 28" TRAVELING TABLE TYPE ROLL GRINDER



MESTA 29" STRUCTURAL MILL SHOWING TRAVELING TILTING TABLE



THE FIRST FOUR-HIGH TANDEM MILL INSTALLED IN THIS COUNTRY FOR THE PRODUCTION OF WIDE ALUMINUM STRIP SHEETS

MESTA MACHINE COMPANY · PITTSBURGH, PA.

ble for, but it was advantageously handled and 'was reflected in a manufacturing cost saving of $1.00 per ton of iron.'

"There was a reduction in the coke rate of the order of 13 per cent, due to a number of changes both physical and chemical in nature and the multiple effect of these several factors is thought to be the explanation of the decrease in coke rate obtained.

"This startling innovation in blast furnace practice has caused as much controversy as did the Gayley dry blast in 1904. James Gayley increased the tonnage of his 90-foot blast furnace from 350 tons to 447 tons per day (24.8 per cent) and decreased the coke from 2147 to 1726 pounds per ton of pig iron. And now Joe Slater has increased the tonnage in his 107-foot furnace from 1169 tons to 1435 tons per day (22.75 per cent) and decreased the coke from 1746 to 1494 pounds per ton of pig iron (14.4 per cent). Gayley started from a high coke consumption at a time when "a pound of coke per pound of iron" was thought to be good work; therefore his 19 per cent reduction in coke was easier than Slater's 14 per cent.

Pig Iron Producers Struggle To Meet Demand

Wilfred H. White, metallurgist, Jackson Iron & Steel Co., Jackson, O.: "Of all the shortages in recent years none has been worse or more far reaching than the shortage of pig iron. A valiant effort has been made by blast furnaces generally to supply this excessive demand even to the point of using worn out and obsolete equipment as long as it would hold together. It was inevitable that shutdowns would come and these have aggravated the situation recently. Many blast furnaces have resorted to reducing silicon content in order to increase their tonnage.

"Producers of blast furnace silvery pig iron have had excessive demands for their product for several reasons: 1. High demand common to the whole industry. 2. Foundrymen wished to use sound metallurgy in the use of scrap in place of pig iron and this required a small percentage of silvery pig iron in the melt. 3. They looked to the blast furnace silvery producers to supply their shortage of silicon in other grades of pig.

"4. Most malleable plants are now using the duplex process which requires a low carbon content in the charge without risk of any alloy contamination. This can be obtained best by the use of a good grade of steel scrap and sufficient blast furnace silvery pig iron to give the required silicon content. Where short cycle annealing has been installed, this means more silicon than previously used in the old batch type annealing furnaces."

Use of Oxygen in Steelmaking Yields Constructive Data

George V. Slottman, manager, technical sales division, Air Reduction Co., Inc., New York: "Eighteen months of intensive application of oxygen to the various processes of the steel industry, yielded data which permit drawing some general conclusions respecting the practicability and the economics of such operations.

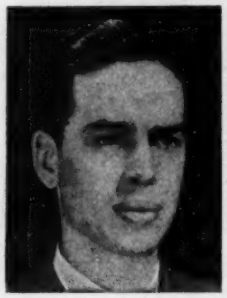
"In the open hearth, oxygen has been used for controlling the hot metal analysis particularly with respect to silicon content; in scrap melting both through the end burners as well as by direct impingement on the preheated scrap; for injection immediately following hot metal additions to hasten the lime and ore boils; and in finishing low-carbon heats. Of these uses, that of finishing low-carbon heats has become a standard operation, involving relatively small volumes of oxygen as presently available. With the exception of small foundry furnaces, and the older steelmaking furnaces, which have made limited use of oxygen to hasten the scrap melting and the lime boil, the remaining oxygen applications are limited in practice by two factors — inadequate charging facilities, and the availability of large volumes of low purity oxygen.

"Regarding methods of applying oxygen, the majority of plants are still using the simple bare pipe for injection. Many plants have discontinued combustion experiments, having obtained sufficient data to predict what can be done with tonnage oxygen when available.

"Some work is being done in foundry cupolas, using enriched blast up to 24 per cent oxygen. Increases in output of some 20 per cent with coke savings of 8 per cent have been noted. Since foundry cupolas do not work continuously, the economics of this application are questionable. Moreover, much of the urge for this application is being supplied by the present poor quality of foundry coke. Oxygen is being applied experimentally in the bessemer converter and with particular reference to the nitrogen content of the finished steel. This work is still in the initial stages of experimentation."

Oxygen Cutting Technique Boosted By Hot Cutoff Operations

R. S. Babcock, development engineer, The Linde Air Products Co., New York: "Use of oxygen-cutting for severing steel sections continues to grow through the introduction of hot cutoff operations in steel mills and forge shops. Continued demand for all types of steel products has induced many mills to roll heavier sections than formerly, which in many cases are too large for existing shears and hot saws. Delivery on new mechanical cutoff equipment is slow and the cost is high.

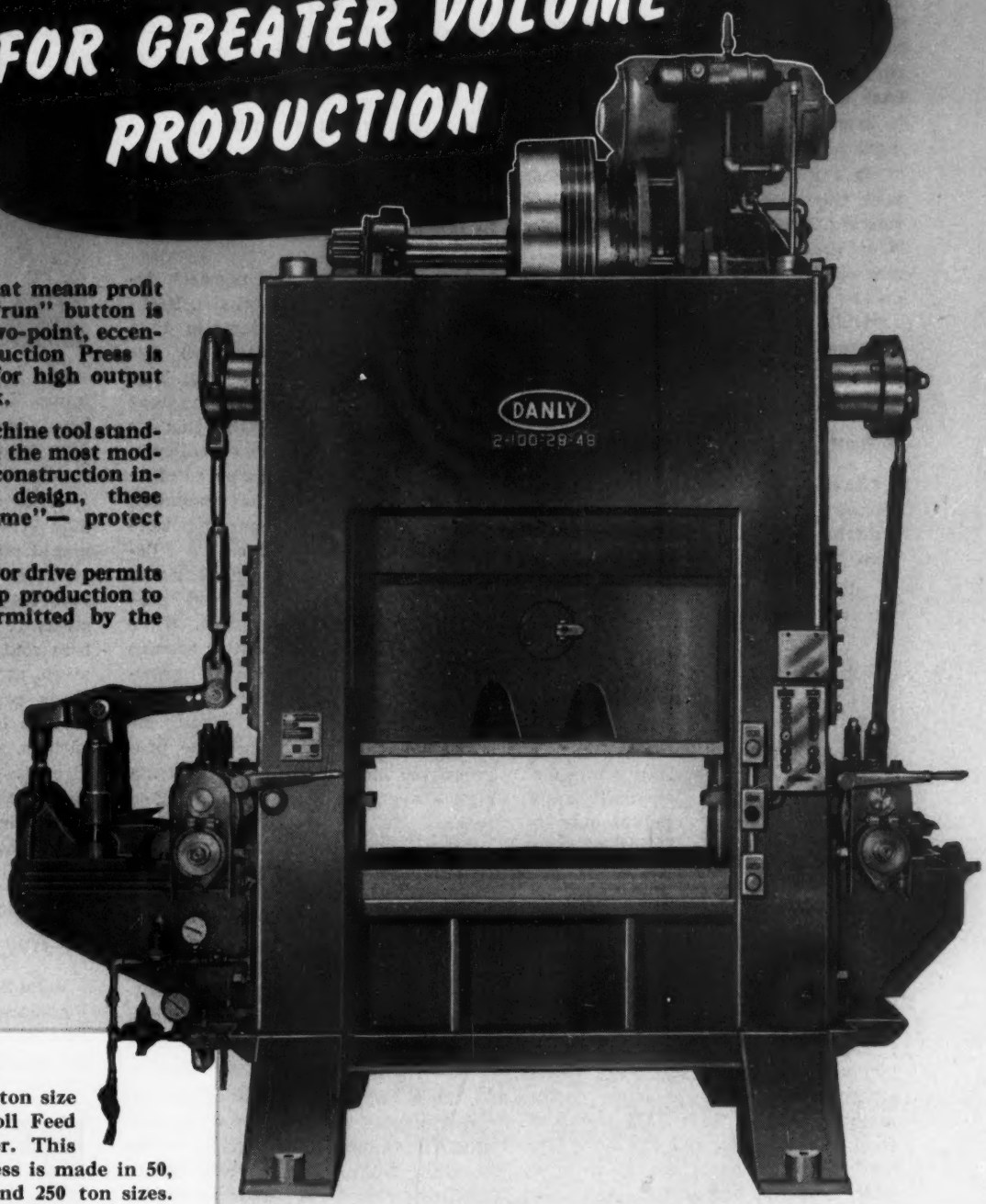


"Many temporary oxygen-cutting installations are used to pinch hit when normal mechanical severing break down in bar mills, blooming and slab mills, and plate and strip mills. These temporary installations permit continued rolling with little change in production during the repair period."

Lancing Operations Cause Decided Rise in Temperature

L. D. Culp, field engineer, Leeds & Northrup, Philadelphia: "Practically every producer of steel is now engaged in extensive improvements in plant facilities for increasing operating efficiency to offset high material and labor costs. Automatic process control equipment for some processes as well as instrumentation for aiding manual control of other

HIGH PRODUCTION PRESSES FOR GREATER VOLUME PRODUCTION



HERE is a press that means profit every time the "run" button is pushed. This Danly two-point, eccentric gear, High Production Press is specifically designed for high output of strip up to ¼" thick.

Sturdily built to machine tool standards of precision, with the most modern features of press construction incorporated in their design, these presses cut "downtime"— protect costly dies.

A variable speed motor drive permits the operator to step up production to the highest speed permitted by the material being stamped.

Compare the features and construction of this line of presses against those of their type with which you are now familiar. Danly's Press Division will be glad to supply more complete information upon request.

Shown is the 100 ton size equipped with Roll Feed and Scrap Cutter. This type of Danly Press is made in 50, 75, 100, 150, 200 and 250 ton sizes. Send inquiries for your requirements to Danly.

Check and Compare These Features

- Two slide connections for accurate alignment.
- Fully enclosed construction (all weldments thoroughly stress relieved before machining).
- Circulating filtered oil pressure lubrication system. Pressure pump so arranged that press is inoperable until oil pressure builds to operating pressure.
- Variable speed motor drive (50-100 strokes per minute).
- Danly Improved Air-Friction Clutch.
- Flywheel shaft mounted on anti-friction bearings retained in removable pillow blocks provides easy accessibility for maintenance.
- Eccentric Gears, connections and gibs—bronze lined.

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MACHINE SPECIALTIES, INC.

2100 S. 52nd Avenue, Chicago 50, Ill.

THE PRESS FOR MODERN PRODUCTION

processes are playing important roles in raising performance levels and increasing overall operating efficiency. Probably the most important development in the field of steel production during the past year has been in the further study of the use of oxygen in both the open-hearth and blast furnace processes. These studies have shown tremendous potentialities in increased production and fuel savings.

"In the open hearth, for example, both the time of meltdown and the refining time are reduced appreciably. New time cycles encountered with new operating conditions existing, increase the value of instruments and controls as tools in the hands of the furnace operators."

Sees Strong Indications of Return to Standard Steels

Charles M. Parker, secretary, committee on manufacturing problems, American Iron and Steel Institute, New York: "The year 1947 was characterized by a strong trend toward the return to standard steels and standard specifications. In the past such trends made themselves apparent only in times of war when purchasing for armament and shipbuilding dominated the market.

"Now, with demand exceeding supply for peacetime uses, purchasers are finding that adherence to nationally recognized standards is good business because deliveries are accelerated and quality is more easily maintained. The AISI-SAE standard steel compositions, and the more formal specifications of ASTM cover a wide range of engineering and constructional steels which steel mills are in position to furnish more promptly than specialties because of their widespread use. Moreover, more technical data and more experience records are available on standard steels than on specialties, a distinct advantage to the designer.

"At the present time the specification of standard steels is of distinct benefit to the entire economy because by their use raw materials and manpower are conserved. Equally important has been the wide acceptance of standard sizes for structural shapes, carbon steel bars, and bar-size shapes, wire nails, staples, barbed wire and woven wire fence.

"Without that combination of simplification and standardization which made possible long tonnage runs of the given commodities it is doubtful that the steel industry could have established the all-time peacetime production record that has prevailed for the past year and is continuing."

Cold Charging Is Bottleneck In Most Open Hearth Plants

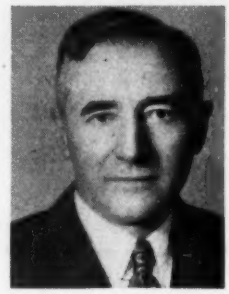
J. S. Marsh, engineer, research department, Bethlehem Steel Co., Bethlehem, Pa.: "It is axiomatic that scrap cannot be melted on the charging buggy. Consistent with this is the common experience that increased charging time means decreased rate of steel production. The matter became one of growing concern during the war; as the quality of scrap deteriorated, it became progressively more difficult to maintain high charging — therefore melting — rates.

"Here and there, different expedients were tried, with varying success: turnings were burned, balers were installed, charging-box size was increased. Shearing and flame cutting increased. Many an operator became firmly convinced that the matter of scrap preparation and handling is one of the major problems facing the industry.

"Then came the spate of oxygen experiments, which showed quickly that, if fullest advantage is to be obtained from the inherently faster melting, everything said about the importance of scrap preparation and handling goes double. This has led to speculation upon such matters as furnaces having all-door frontwalls to permit faster handling of charging boxes, or even to permit 'one-shot' charging. However, it seems possible that this would not result in maximum melting rate; i.e., overall heating rate may be higher with exposure to the flame of successive layers of scrap charged in the conventional manner. If this is true, there is clearly an optimum charging rate for a given furnace."

High-Temperature Corrosion Resistant Steel Developed

C. A. Crawford, development and research division, International Nickel Co. Inc., New York: "An interesting development called for by the engineering demands of materials for use in aircraft gas turbines, is the alloy Inconel X. This is a modification of the standard alloy Inconel, containing 75 per cent nickel, 15 per cent chromium, 7 per cent iron, to which have been added hardening elements, titanium, aluminum and columbium, in small amounts.



"This nickel base alloy has very high strength at room temperatures and at all temperatures up to at least 1000° F; in this respect it compares favorably with carbon and low alloy steels at the lower range of temperature and is far stronger than most steels at temperatures above 700° F. It is proving very useful for gas turbine blades, turbine rotors, bolts, springs, and sheet metal structures in aircraft gas turbines and it is expected that the alloy will find usefulness in gas turbines for stationary applications."

What Does Next Decade Promise By Way of Improvements?

John S. Unger, retired metallurgist, Pittsburgh: "Properties of oxygen have been well-known for many years, but until its production in a large economic way (tons per day instead of cubic feet), it has not been given much thought metallurgically. Oxygen is important in basic open-hearth steel manufacture and is rapidly growing in importance in blast furnace practice.

"Let us conceive a future blast furnace 50 feet high, with a constantly flowing tapping hole and cinder notch and without hot blast stoves but

with a top capable of resisting a top pressure of 5 pounds to reduce the dust production and with dust catcher to catch what little dust is made. Instead of lifting 7 tons of solids or gases 100 feet into the air, we need only lift it 50 feet. Some horsepower may be needed to compress a little air as a dilutent. Why ask the oxygen to give four volumes of nitrogen a free and useless ride in furnishing the blast? Shall the lining be of carbon brick or silicon carbide? Shall the capacity be 2000 tons or more daily?

"With the feather-weight metals aluminum, silicon, and magnesium gradually decreasing in cost and iron increasing, the difference will soon justify drastic steps to reduce the cost of steel. About 70 per cent of all the steel made is of about 70,000 pounds tensile strength and 10 per cent elongation. Feather weight metal producers have made alloys of 80,000 to 110,000 pounds tensile strength and these alloys are true competitors where they can be used as substitutes on account of little corrosion and less weight.

"Why must steel, except for some special purposes, be made of such special purity? Basic open-hearth steel has low phosphorus and sulphur. Why not allow the phosphorus and sulphur to go to about 0.150 per cent each?

"Improvements in threading, drilling, machining, and case-hardening can be tolerated in high-sulphur low-carbon, and soft steels."

Trends in Steel Industry Swing Toward Refinements

L. F. Reinartz, manager, American Rolling Mill Co., Middletown, O.: "Output of sheet and strip steel in 1947 was far greater than in any previous years, and this in spite of shortages of supplies, excessive repairs, high maintenance, and delays due to interference of new construction. Many improvements in operations have been affected through better training of personnel, the use of new tools, and the ingenuity of operators in the steelmaking business.

"Pressure blowing and the use of oxygen enriched air are receiving much attention in blast furnace operations. More work has probably been done on pressure blowing, which offers the advantage of increased pig iron capacity and possibly lower coke consumption per ton, as well as the utilization of lower grades of iron ore. However, such increase in production will be slow because of the necessity to provide increased blast blowing capacity. Use of carbon block in blast furnace hearth rebuilds is becoming more common. Studies are being made of stocking and charging operations to help speed up blast furnace production.

"Intensive work is being done by several companies on the beneficiation of low-grade and complex iron ores. This is an absolute "must" in order that the steel industry will have an assured supply of iron ore.

"In the open hearth department considerable progress has been made in the use of oxygen, either to enrich the combustion air or to blow into the metal bath for carbon removal. Sufficient increased production has been apparent already to cause many operators to study carefully their charging and pit facilities. Many plants must spend considerable money in order to charge scrap iron and hot metal into the open hearth rapidly enough to utilize to the maximum the higher flame temperature or the more rapid elimination of carbon, as well as being able to handle more steel through their open-hearth pit.

"Refractory manufacturers during the year have made advances in new refractories and improved products for open-hearth use. Basic ends have been installed in about 25 open-hearth furnaces throughout the industry, which, based on furnace repair cost alone, have paid for themselves. Progress is being made in the use of suspended chromium - magnesite brick over the open-hearth bath. Successful development of a brick for such practice will permit the operator to use higher flame temperatures and thus increase production.

"It may be that this type of roof will be needed when oxygen is used to reduce carbon in the bath of the open-hearth furnace because of the splash hazard from the basic slag.

"Since the use of a carbon block hearth in some blast furnaces has shown sufficient progress, several open-hearth operators are considering the installation of such block in place of the chrome brick beneath the rammed or burned refractory hearth in the open-hearth furnace.

"Supply and quality of fuel for metallurgical purposes are becoming big problems. The sulphur content of some fuel oil has been going up to a point where in certain areas operators are now having to use oil containing as high as 3 per cent sulphur. High-sulphur oil presents problems in many metallurgical operations throughout a steel plant—other than just the open hearth department.

"The scrap situation has been critical, and is likely to become even more so. Need for scrap iron has forced a number of steel companies to rework dumps in order to obtain whatever scrap they can from this source."

Coal Washing Facilities May Bring Needed Relief

C. D. King, chairman, operating committees, United States Steel Corp., Pittsburgh: "During 1947, blast furnace operators almost without exception were faced with the problem of maintaining maximum pig iron output with poorer coke than heretofore available, and the production per unit accordingly reflected this unfavorable situation. With the installation of coal washing facilities, this problem is expected to be solved in part at some plants in 1948. Comprehensive programs are under consideration involving beneficiation of ores both with respect to chemical composition and physical character. These long range programs, however, will not be effective in 1948. Use of high-top pressures at a selected number of blast furnaces during the past year has demonstrated possibilities which many companies first intend to confirm under their own conditions. It is expected that at least two blast furnace units will be operating on oxygenated air this year.

"During 1947, in spite of serious deficits of hot metal, open-hearth production surpassed all previous peacetime efforts and this output is expected to be further increased in 1948 as a result of ingot expansion programs, amounting to a total of 2,500,000 tons capacity and scheduled for completion in that year. The experimental use of oxygen to supplement combustion air and for the rapid removal of carbon in the bath con-

tinued to engage the attention of many open-hearth operators during the past year. The value of the first was more marked at those plants employing high percentages of scrap as opposed to high percentages of hot metal. Use of oxygen for carbon elimination was invariably accompanied by an appreciable increase in production rates and decrease in fuel consumption."

Oxidation-Resistant Steels Conditioned by Powder Scarfing

E. M. Holub, development engineer, The Linde Air Products Co., New York: "Powder-scarfing has made it possible to condition oxidation-resistant steels as readily as low carbon steels. The process consists of introducing a combustible metallic powder into the scarfing reaction zone to aid in melting and fluxing away the oxidation-resistant elements of the steel.

"It is being used successfully for conditioning ingots, bloomed ingots, blooms, billets, and slabs. It has been readily shown that scarfing can economically condition materials which would otherwise be considered scrap if mechanical means of salvage were the only means available."

Flame Cutting Integrated With Rolling Mill Operations

R. F. Helmkamp, machine cutting specialist, Air Reduction Sales Co., New York: "With the development of precise technique and suitable equipment for oxyacetylene cutting of blooms, billets, etc., at rolling mill temperatures, the cutting torch has been integrated with the equipment and timing of various hot rolling operations in several steel mills. Important advantages for the steel producer have arisen from this facility.

"Key to this development is the fact that by cutting at rolling mill temperatures, cutting speeds can be increased to the point where the operation keeps step with the rolling mill. Equipment for hot cutting on the roll line includes some of the highest developments in gas-cutting machinery. Practically all installations are controlled remotely, from a central point, where every phase of operation is under switch and/or push-button guidance from a single operator, while water cooling and heat shielding of the mechanisms near the cut protect against the high temperatures of the hot metal. Cost of such equipment is low, so that the savings available with hot cutting are found not only in production operations but particularly in the capital investment required.

"While hot cutting of steel on the roll line is a proved practice, it is only a beginning, pointing to several possible further applications of the basic technique, which may open up a whole new field of flame-cutting operations."

Controls Furnace Operation By Temperature of Product

Fred S. Bloom, Bloom Engineering Co., Pittsburgh: "One of the helpful and progressive developments in the art of heating steel for rolling and forming is the application of steel temperature measurement. This process has been developed so that accurate readings can be made and an entire furnace operation controlled automatically by temperatures of the product measured within the furnace.

"Demonstrations of this method of furnace control prove that a large billet heating or slab heating furnace can be automatically controlled to produce a product discharged to the mill at a given fixed temperature within narrow limits of the temperature required. The method has proved that slabs can be delivered to a mill from a group of furnaces at the same temperature, so that rolling practice and closer tolerances may be maintained on the finished product.

"Experience so far obtained in the use of steel temperature measurement for controlling billet heating furnaces indicates that greater production can be produced without excessive high temperatures being developed in the heating chamber of the furnace. Experience also indicates that with good product temperature measurement the slagging of the furnace hearth and the burning down of the furnace sidewalls can be prevented. Careful studies indicate that furnaces as now operated and built do not reach high working temperatures in the furnace chamber when the steel is being heated. Excessive furnace temperatures only occur at times of no delay, or times of slow rolling.

"It is to be expected that the proper application of steel temperature measurement will contribute much to our ability to replace the old time furnace heater, because it can do a much better job of determining steel temperature than can the observation of any old time heater."

Oxyacetylene Cutting Speeds Ship-Scrapping Operations

B. H. Acomb, development engineer, The Linde Air Products Co., New York: "Because of the current shortage of steel scrap, the field of ship scrapping has become vitally important to the steelmaking industry. Economical oxyacetylene cutting of ship plate has been achieved through the use of lightweight, inexpensively modified standard equipment, designed for maximum portability and ease of operation.

"Nearly all ship plate is covered with heavy layers of paint, rust, or marine growth and, in some cases asbestos or tile-like insulating compounds. Before cutting, the insulating compounds must be removed by either hand or pneumatic chipping spades. Plate covered with paint, rust or marine growth is economically cut without previous cleaning by using specially designed nozzles."

Large Sintering Facilities Required for Agglomeration

W. J. Urban, engineer, American Ore Reclamation Co., Chicago: "Increasing interest in concentration of the low-grade iron ores will demand better and larger facilities for agglomeration of the concentrates. While several different methods of agglomeration have been developed, sintering still is the predominant process.

"Sintering units now in use have a maximum capacity of about 1800 tons of sinter in 24 hours. This is ample for sintering the fines from existing ores. But when all of the ore must be agglomerated, sintering units of much greater capacity will be re-

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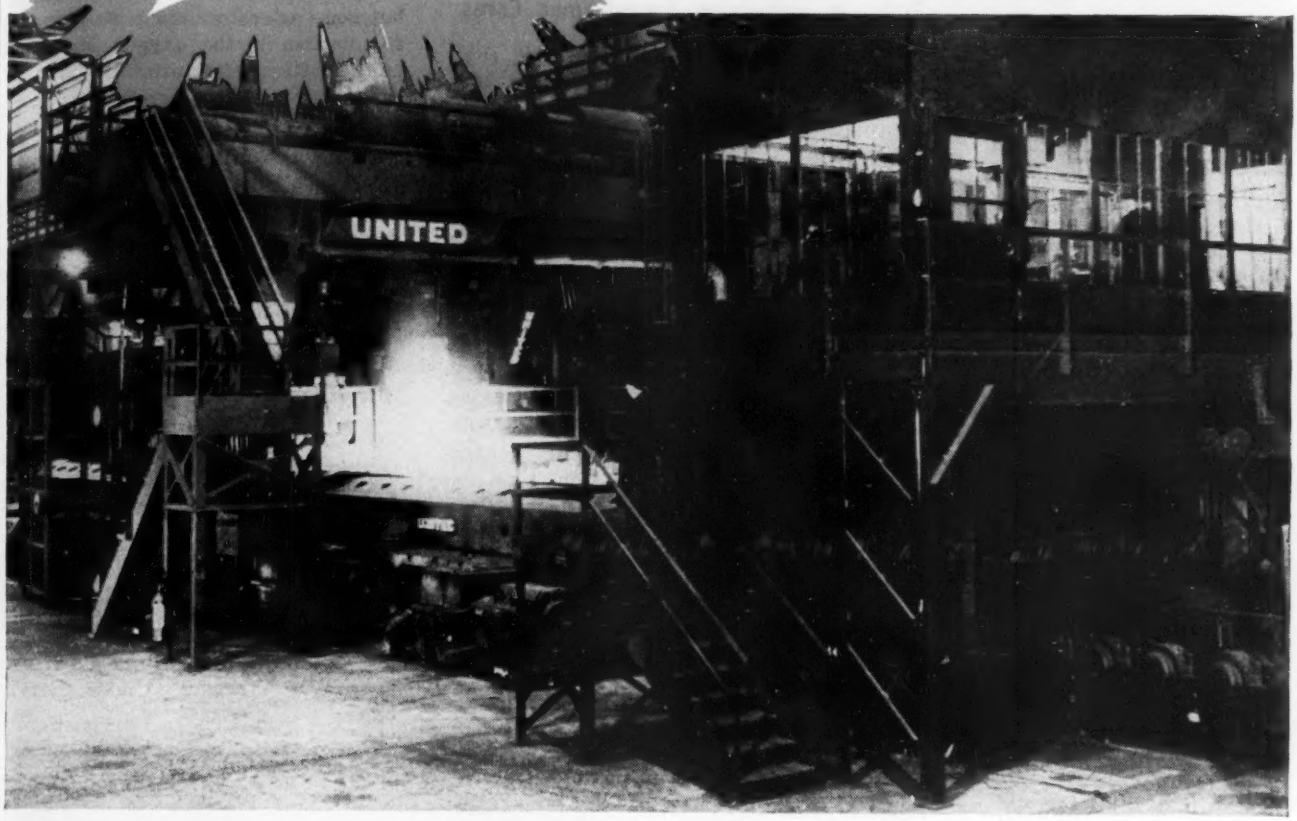

168,481 INGOT TONS IN OCTOBER!

Last August we announced the rolling of 159,792 tons of ingots in one month on this, the world's first anti-friction bearing equipped slabbing mill installed at the Homestead Works of Carnegie-Illinois Steel Corporation — a world record.

During the month of October this production was exceeded by 8,689 tons, a total of 168,481 ingot tons being rolled, topping by more than 16,000 tons the highest tonnage ever rolled in a single month on any other slabbing mill.

A new slabbing-blooming mill, 45" x 115" using the same size Timken Roll Neck Bearings is now being built.

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quired to reduce the cost per ton to the minimum.

"In one foreign country two sintering units with nearly twice the hearth width of those now in use here have been in successful operation for several years. Recently in this country much interest has been shown in the larger units. At the present time several are under consideration, and it is believed these larger machines will be a substantial contribution to the production of a high-grade blast furnace raw material."

Studies All-Basic Open Hearth As Means of Increasing Output

A. K. Moore, superintendent of open hearths, Steel Co. of Canada, Ltd., Hamilton, Ont.: "In Canada as elsewhere on the continent, emphasis remains on maximum ingot production.

"In the effort to achieve maximum production consistent with economy, we have continued with experimental work on all-basic open-hearth construction and the use of oxygen in the open-hearth bath as a combustion aid and as a carbon reducing agent in the bath.

"At our plant, full basic end construction has been proven to our satisfaction and is now a standard design for our 180-ton open hearths. Through reduced repair costs, plus the effect of increased production, due to reduced repair time, on fixed costs, the installation is paid for in two and a half to three years of operation, and from there on yields a profit on open-hearth costs plus 5 per cent additional production.

"The basic main roof is still experimental, but continues to show sufficient promise to encourage further work. We have the fourth such roof in operation at the present time and from all appearances, after 300 heats, the life of this roof will exceed our best previous life of 380 heats by 50 heats or more. This will bring the labor and material cost per ton of the basic roof fairly close to that of silica and the savings due to increased production will probably exceed any unfavorable differential considerably.

"The series of four such roofs has produced a production increase averaging 15 per cent through consistently lower heat time and repair time, and for a 'no patch' roof life of 500 heats or more should be economical as well as productive in the average shop with conventional firing practice."

Powdered Iron Molding Used In Television Transformer Cores

C. T. Martowicz, iron core engineer, Henry L. Crowley & Co. Inc., West Orange, N. J.: "Better efficiency, improved performance and lower cost of television receivers has been made possible by the use of powdered iron moldings for the transformer core material. The horizontal deflection transformer and deflection yoke used in television systems employing magnetic means for the deflection of the electron beam have previously been constructed from laminated sheet or strip metal stock.

"Use of special type high permeability powdered iron cores in these systems has resulted in more efficient operation at a very substantial reduction in cost and has, in addition, eliminated noise inherent in all laminated transformer structures. Finely divided sponge iron is employed for this application, with the use of very high molding pressures to obtain optimum permeability. Permeabilities on the order of 40-200 are commonly obtained with high values of 'Q.' The latter factor eliminates the energy loss from the transformer cores and yoke previously encountered."

Oxygen Practice Still in Experimental Stage

J. L. Schueler, general superintendent, Continental Steel Corp., Kokomo, Ind.: "Principal experimental work which has been carried out during the past year in open-hearth practice has related to the use of oxygen for reducing carbon and as an aid to more intensive combustion; basic brick; and the use of light weight and alloy scrap with smaller iron charges.

"Use of oxygen is still in the experimental stage both as a means for carbon reduction and as a combustion aid. In the first instance the practice has been to introduce the oxygen below the surface of the bath, by a steel pipe which has been slagged to prevent burning up too quickly.

"Some recommendations have been to introduce the oxygen just below the slag steel interface. Others enter the oxygen close to the bottom. Both methods appear to give good results, but some operators claim damage to the bottom if the oxygen impinges on the bottom refractories. It will take some time and the correlation of results from many open hearths to lay down a standard practice to be followed.

More Designers Rely on Zinc Die Casting Process

R. Davison, manager market development div., New Jersey Zinc Co., New York: "As new products come off the drawing boards it is apparent that more and more designers are relying, wherever possible, on the die casting process to obtain economical production. Under today's conditions, the savings made in such instances are particularly valuable in achieving a favorable competitive position for complete assemblies.

"For many years zinc has been the most widely used metal for die casting for the logical reason that the zinc alloys provide the greatest number of desirable mechanical properties and casting characteristics. Particularly important today is the high speed at which the zinc alloys can be cast, a speed far higher than is obtainable with other alloys for die casting, and a speed not matched in most other high production methods."

Sees Undiscovered Possibilities For Oxygen in Open Hearths

J. H. Janssen, plant metallurgist, Colorado Fuel & Iron Corp., Wickwire Spencer Steel division, Buffalo: "Oxygen is a new tool as far as the open hearth is concerned. It is doing the work intended but from the experience gained so far it appears that there are some very serious drawbacks to be overcome. As far as the use of oxygen through the burners

is concerned, this has not met earlier expectations; however, the lance is very useful in the reduction of carbon and starting the lime boil if the latter is reluctant to come up.

"One most noticeable advantage when oxygen has been used is the improvement in the action of open or rimmed steel in the molds. From the experience so far gained it now appears to have possibilities not yet discovered."

Use of Chrome Silicon Steels For Springs is Increasing

F. P. Zimmerli, chief engineer, Barnes-Gibson-Raymond division of Associated Spring Corp., Detroit: "The spring industry, like many others, is being buffeted between the high cost of labor and a very high cost of steel held to proper spring making tolerances. This has resulted in the determination by engineers to use less of each in an endeavor to provide certain types of spring making at less cost.

"To this end we find an increased use of rubber and air springs. These are on some trucks and trolley cars now, as well as on many drafting boards for the future. The most efficient use of steel for springs is in the form of torsion bars. As a result we find more suspensions being planned using this type of resilient member. The torsion bar has in one or two instances been adapted to valve springs, but here it is viewed as experimental.

"The mechanical spring industry is using chrome silicon steel in increasing amounts to resist spring settling by moderate temperatures up to 400° F. This steel seems to give better performance per unit of cost for this use than other alloy steels commonly used heretofore.

"Springs for electrical use are tending more toward the use of beryllium copper. It seems that the use of this alloy has largely settled down to such places as its superior electrical conductance at spring tempers gives it the preference over other copper alloys.

"The inconels and Z-nickel analyses indicate new efforts have further developed these alloys. Recent tests have shown X-inconel to have good temperature-resistant properties to 750° F."

Decided Swing Toward Moly And Tungsten Steels Noted

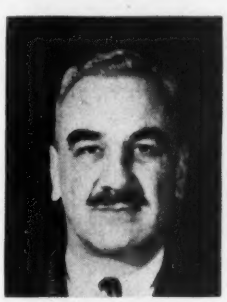
Norman F. Tisdale, metallurgical engineer, Molybdenum Corp. of America, Pittsburgh: "A decided swing to the greater use of molybdenum steels became evident in 1947. Many companies after thorough trials of various specifications have either changed or are in the process of changing to molybdenum steels.

"Application of tungsten to hard surfacing and oil drilling operations has been greatly increased during the year and the future is indeed bright for an increased use of tungsten carbide in these fields. Tungsten high speed has returned to full favor as the general all-around high speed steel and a large increase in high speed steel tonnage is shown for 1947.

"Boron continues to be of wide interest. Its use in the steel castings, malleable iron and cast iron industry increased in 1947. The production of boron-treated steels is slowly making itself known by increased melting tonnages."

Steel Oxygen Requirements Depend on Extent of End-Use

J. H. Zimmerman, manager, development division, The Linde Air Products Co., New York: "Use of oxygen for metallurgical purposes in the open hearth and electric furnace has progressed to the point where the broad outlines of oxygen requirements, production gains and process problems have been defined. Oxygen requirements may vary from 100 to 700 or more cubic feet per ton of steel depending on the extent of its use for direct scrap meltdown, combustion purposes, or decarburization with attendant substantial increases in furnace output.



"Tests indicate that the selective use of small quantities of oxygen for direct scrap meltdown may achieve the same results in accelerating the meltdown period as larger volumes of oxygen used continuously for combustion purposes. Combined use of cheap compressed air for decarburization in the higher carbon ranges and oxygen to attain finishing carbon values will tend to keep oxygen requirements on the low side of the above range."

All-Basic Open Hearth Is Proving Economical

R. P. Heuer, vice president, General Refractories Co., Philadelphia: "One of the more important developments in refractories during 1947 was the marked progress toward the success of the all-basic open-hearth furnace. Complete basic ends in conjunction with silica main roofs have now proved economical in several different open-hearth shops. Starting with two installations in 1944, twenty eight basic end furnaces are now installed or projected in 15 different plants.

"Two completely basic furnaces combining a basic main roof and basic ends were put in operation. In one furnace the entire main roof was built using a design and type of brick which was developed after many years of close study of the problems involved. This roof, although its campaign is incomplete at this writing, equaled the life of the best previous basic roof. This same design and type of brick was also used in one-half of the main roof of the second furnace. This particular section also equaled the life of the best previous basic roof and its campaign is still unfinished. Ultimate roof life expected in these two cases indicates that there is a substantial saving obtainable in the use of the basic roof and the all-basic furnace."

Oxygen Has Many Uses in Iron and Steel Industry

Frank E. Pavlis, technical director, Air Products Inc., Allentown, Pa.: "Uses of high-purity oxygen (99.5 per cent) include: (1) Surface conditioning (scarfing), maintenance (welding and hard facing), scrap preparation (cutting). Scrap preparation becomes increasingly important as furnace capacity is increased;

(2) Carbon reduction in the open hearth and the electric furnace. Use of oxygen decreases the time per heat and the fuel and labor requirements; (3) Direct melting of hot scrap in the open-hearth and the electric furnace. The burning of scrap furnishes heat and produces iron oxide to reduce carbon in the bath; and (4) Blast enrichment in the cupola and open-hearth furnace.

"Uses of lower-purity oxygen (90-95 per cent) include: (1) Carbon reduction in the open hearth and the electric furnace. Eventually it may become standard practice to use air to reduce the carbon content to about 0.50 per cent, and oxygen to reduce the carbon content below about 0.50 per cent; (2) blast enrichment in blast, bessemer, open-hearth, and cupola furnaces."

Copper and Brass Products Improved by New Controls

Herman W. Steinkraus, president Bridgeport Brass Co., Bridgeport, Conn.: "Improved processes and controls have high-lighted development in copper and brass mill products industry in recent years and are bound to exercise a strong influence in the future. Because of the availability of extrusion presses of great capacity, and the development of new extrusion die materials, there are now available stronger and better copper based alloys made by the extrusion process than at any time in this industry's history. This applies not only to aluminum and silicon bronze alloys but to a growing list of new combinations which serve specific purposes.

"In the field of brass strip usage there is a strong trend toward the use of faster presses and a rising demand for longer coils. Customers are also demanding a higher grade of surface, and mills are making progress in that direction by the use of more advanced annealing methods.

"In the field of tube and pipe there is a trend toward the use of higher speed draw benches and the drawing of longer lengths. All of these things reflect the efforts of industry to absorb higher labor costs by more efficient operation. Use of spectrographic

analyses is also growing in the more accurate control of copper, bronze, and brass alloys. With newly developed equipment they are doing things today that were impossible even a few years ago."

Experimental Work on Fusion Piercing iron Ores Continues

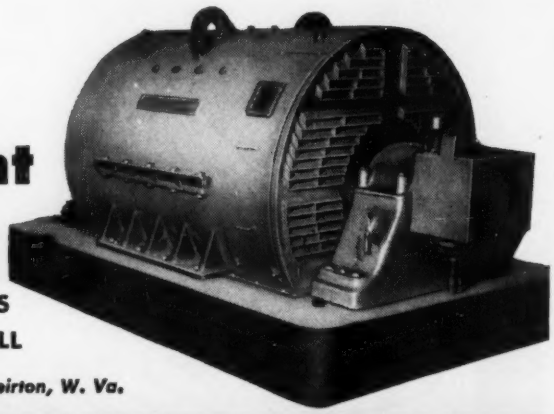
R. B. Aitchison, service engineer, The Linde Air Products Co., New York: "Fusion-piercing, a new process for making blast holes in low-grade iron ore, was first tested experimentally on the Mesabi Range in the summer of 1946. During the past summer additional field tests were conducted with newly-developed process and equipment. A portable rig capable of producing inclined as well as vertical holes was given its first trial run. Both the portable machine and the earlier truck-mounted device were given extensive tests in quartzite, common granite, dolomite, and other rock formations, as well as taconite ores. Experimental work is continuing and apparatus for commercial use of the process is being developed."

Anticipates Modernization Programs in Near Future

A. L. Thurman, assistant to vice president, Aetna-Standard Engineering Co., Youngstown, O.: "Demand for new processes and new types of machinery is showing its influence in equipment now being manufactured. For instance, a new type of continuous galvanizing line has just been put into operation in the Pittsburgh district; two more such lines are being manufactured for the Birmingham district.

"Improvements now being made in sheet galvanizing will broaden the application of this product and will create a further demand for new equipment.

"Automatic feeding and pickling equipment is now being installed in 21 hot dip tinning lines in Pittsburgh district. Automatic assorting and bundling lines now in operation will increase the operating economy of hot dip tinning. It is generally



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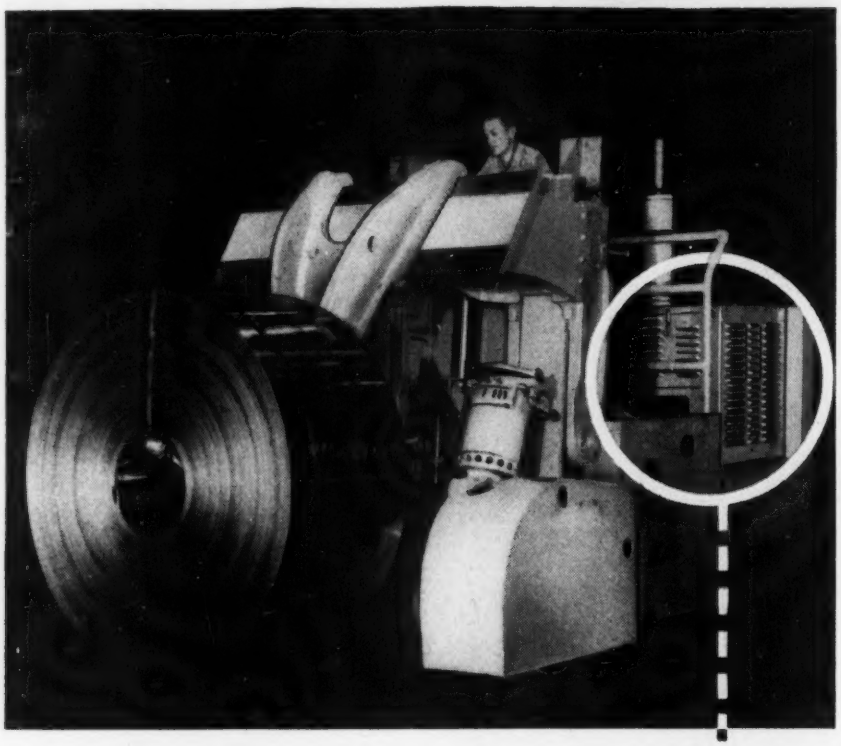

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Illustrated at top is one of two 2250 HP Motors at the Weirton Steel Works, Weirton, W.Va. furnishing *constant power* to drive the finishing rolls of the world's fastest cold-reduction strip mill capable of mile-a-minute production.

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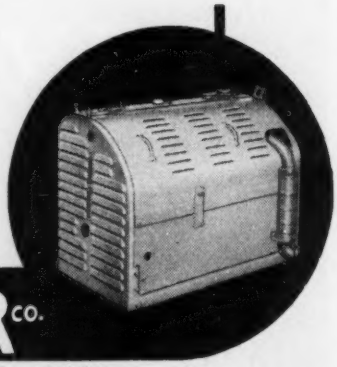

THE READY-POWER CO.

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agreed that these improvements and other new ideas will greatly increase hot dip tin plate production, creating a further demand for new equipment.

"A new continuous long terne line will soon be put into operation in the Chicago district. This line will process 50,000-pound coils, and will also be arranged for alternatively delivering coils or packs. New demands for terne plate will call for new equipment of this type for the steel industry.

"Recent developments in welding will make possible improvements in continuous plating lines, pickling lines and processing lines of all types. A new mash-type welder which should have a significant place in the future operation of processing lines is being developed by different welder manufacturers.

"In steel and nonferrous tube mill operations, there have been many recent developments. Two new continuous high speed tube rolling mills going into service during 1948 promise to revolutionize seamless tube output."

Large Hearth Blast Furnaces May Produce 1500 Tons

Owen R. Rice, metallurgical engineer, Freyn Engineering Co., Chicago: "Twenty-eight-foot hearth, lined with quasi-electrode carbon, and fitted with an alliteration of 28 tuyeres, currently symbolizes the modern American blast furnace. And from there it is only two short footsteps to the once-a-century profundity and rotundity of a 30-foot hearth diameter.

"Given a moderate break on coke quality—and provided the Damoclean sword of ore quality deterioration is suspended from a good stout horsehair—these 28 footers should crowd at the figure of 1500 net tons production, day by day.

"The carbon hearth may win new lining-life laurels that may retire the prideful 3 million ton banners to the glass cases in the armories.

"Oxygen and high-pressure are the 'livelier playthings' for the ever youthful propensities of American blast furnace thought. High-pressure operation has exhibited some impres-

sive demonstrations through '45-'47, and within this current year of 1948, oxygen enrichment of blast—reckoned with as far back as the earliest Gary days—promises the world the first single-tongued, commercial scale reports.

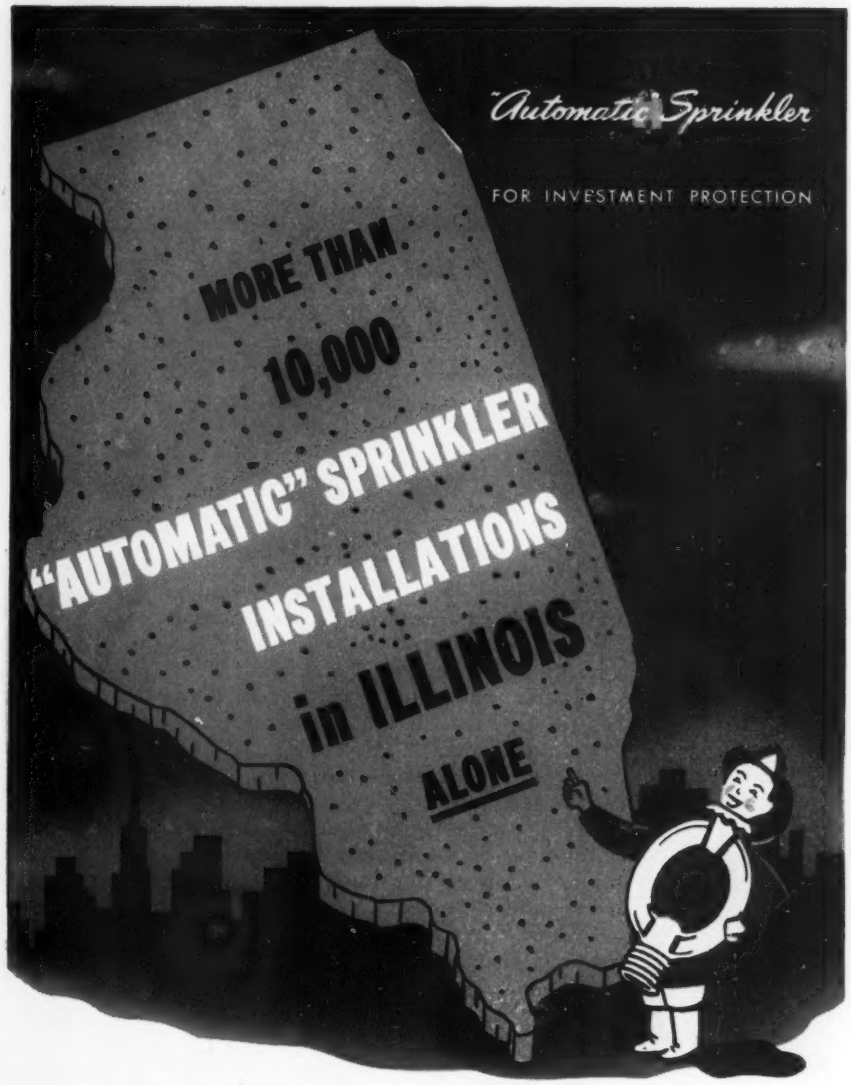
"The worth of blast furnace gas is due for considerable enhancement above the long-time basis of boiler coal equivalent. Markedly expanding applications to coke oven underfiring is releasing valuable coke gas to highly remunerative uses."

Engineers Turn Attention to Merchant Mill Improvements

G. G. Beard, vice president, United Engineering & Foundry Co., Pittsburgh: "Since the end of the war, the focus of attention on developments in the steel industry with regard to rolling mills and finishing equipment has been almost exclusively directed to high-speed tandem mills for cold reduction and processing equipment for flat rolled product.

"While progress on such equipment still occupies general attention, considerable thought has been given by engineers and operators alike to improvements in merchant bar and section mills, which have been, due to stress of more immediate demands, neglected for many years and where there is a wide field for development.

"Flexibility in the operation of merchant bar and section mills is being stressed. Designs now on paper tend to obtain a maximum of size and weight range on any one unit with a minimum of equipment. Correlated with this objective are endeavors to minimize mill shutdown time when changing rolling schedules from one size or shape to another, accomplished by well thought out roll pass design, facilities for quick roll stand adjustment and the minimizing of roll changing and guide setting. Developments which have been made in the foregoing have not been made without careful consideration to the improvement in quality of product, both as to size, tolerances and surface quality. An interesting result of the present development of mills of this type is that in addition to accomplishing these results, the number of



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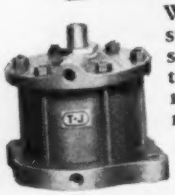

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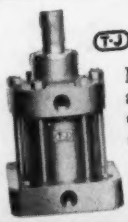

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rolls and guides, which become a large item of capital expenditure in mills of this type, has been considerably reduced from previous designs.

"Electrolytic tin plate continues to occupy a place of importance in current development. With the growing demand for electrolytic plate and its acceptance for more and more containers heretofore utilizing hot dip plate, there is a considerable demand for higher speed lines embodying refinements calculated to improve coatings to the highest degree. The developments necessary to accomplish the demands include improvements in all the main phases of the process, the cleaning, plating and reflowing.

"Developments in the nonferrous fields and particularly for flat rolled products are centered in processing lines for continuous annealing, heat treating and pickling. Of particular interest in lines of this type is threading equipment for continuously feeding light-gage material through such lines to avoid breakage of the material due to its low ultimate strength under elevated temperatures.

"Whereas progress continues on development in all phases of the industry, no great impetus will be given to new development until such time as the various manufacturers of rolling mill and finishing equipment find relief from their present heavy backlogs of more or less standardized equipment."

Increased Use of Modified Malleable Iron Observed

R. J. Cowan, metallurgical consultant, Cleveland: "One observes with interest the increasing use of modified malleable iron in a variety of applications. This is being manufactured in a number of different ways:

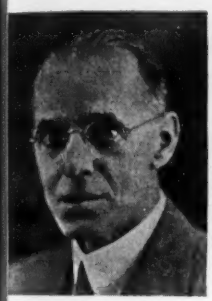
Sometimes by heat treatment of an iron having the usual 'malleable' composition, and sometimes by the use of an iron of unusual analysis that is given a specialized heat treatment.

"When it is recalled that 'malleable' as cast has a combined carbon content of some 2.50 per cent, and that after the so-called annealing it contains only about 0.10 per cent or less combined carbon, the balance

remaining as temper graphite, one can visualize the vast range of intermediate products that are possible during the graphitizing operation. In view of these possibilities it must be admitted that only a comparatively few of the many possible applications have been made.

"This whole art will be opened up when more precise heat treating methods are used. Lack of precision has caused uncertainty of product which handicaps the extended use. Some day the light will dawn. Maybe it will be this year."

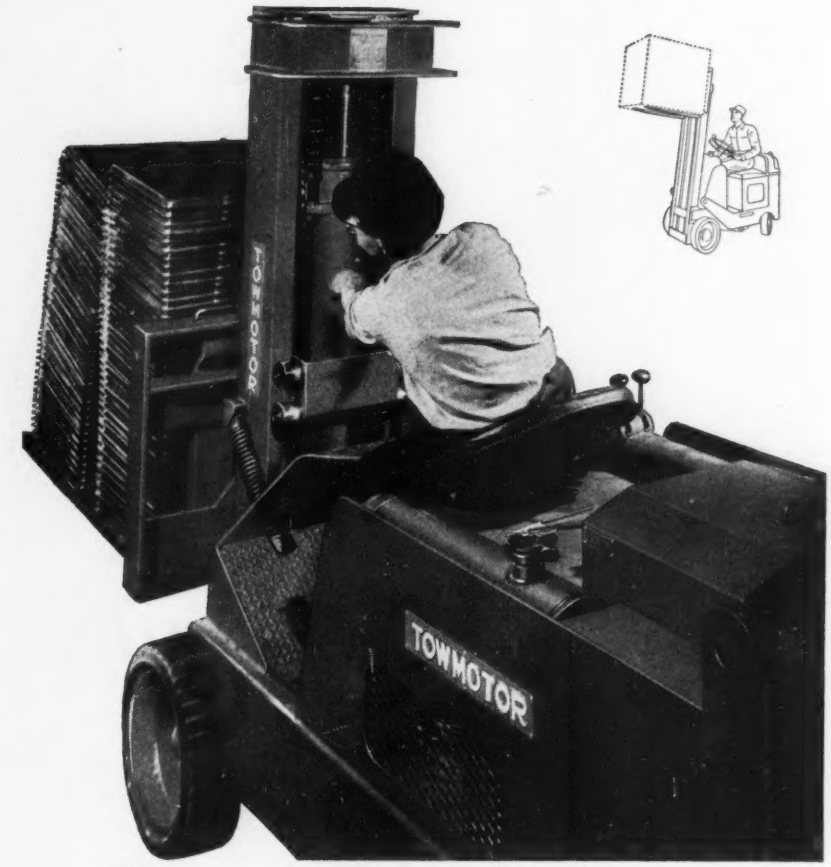
Improved Production Method Used by Wire Industry

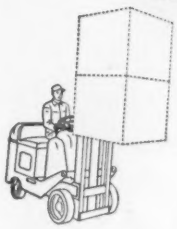


Henry C. Boynton, consulting metallurgist, Trenton, N. J.: "During World War II and up to the present time, many important developments in the wire industry have been brought forward, some due to war necessities, while others evolved in the course of metal progress.

"Briefly some of the trends may be listed as follows: (a). Manufacture of 'tailor made' steels with predetermined grain sizes to suit particular jobs and more particular customers. (b). Advent of the big package or coil weighing 1000 to 2000 pounds to eliminate scrap and splicing and to cut cost of transportation of small units. (c). Gradual elimination of all but one pickling—that in the rod—by heating under controlled atmospheres to prevent all oxidation: This 'bright annealing' process has been regular procedure for some time in flat wire manufacture.

"(d). Careful regulation of patenting speeds and temperatures to obtain ideal microstructures rather than to produce any exact tensile strength, thereby yielding higher endurance properties in the finished wire. (e). Partial or entire elimination of lime both as an acid neutralizer and as a wire drawing adjunct, by the so-called 'alkali coating' bath that also inhibits rusting to a great extent, during processing. (f). Higher speeds are employed in wire drawing, due to newer, faster, precision-built machinery that dissipate most of the high heat due to the wire





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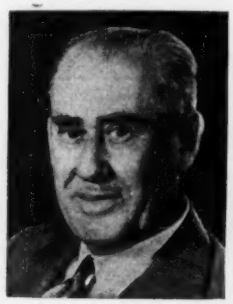
drawing reduction. This fact in particular is true of fine wire which is being used in ever increasing amounts. (g). Bigger and better handling machinery and better designed plants to shorten or eliminate transportation 'bottle necks' between departments.

"(h). Increased call for stainless steel alloy wire, particularly type 304 which is most commonly used today. Note the use of stainless steel wire for the new magnetic wire recorders, now on market."

Patents Indicate New Trend in Wrought Zinc Base Alloys

Oscar E. Harder, assistant director Battelle Memorial Institute, Columbus, O.: "There are indications of new types of wrought zinc-base alloys. In the past, major production of wrought zinc-base alloys has been with minor amounts of such metals as lead and cadmium which occur naturally in some spelter and to a lesser extent in alloys containing such elements as copper, or copper and magnesium. In general, such wrought materials were used in the cold-rolled condition. Poor creep resistance of the zinc and the more common zinc-base alloys has long been recognized, and numerous patents have claimed alloys of improved creep resistance. However, the use of such alloys has been relatively limited. The heat-treatment of these zinc-base alloys to improve their properties in the final condition, has had little or no use.



"However, two patents may serve to indicate a new trend. U. S. Patent 2,412,045, issued Dec. 3, 1946, to Richard H. Harrington and assigned to General Electric Co., disclosed a zinc-base alloy containing the metals copper and beryllium. In the narrow range of composition given, the copper is 1.9 to 2.1 per cent, and the beryllium 0.35 to 0.15 per cent. Such an alloy is shown to respond to heat treatment, and as disclosed by the inventor included such combinations as solution anneal followed by aging, and then by cold reduction. Special claims for an alloy processed in this way are high proportional limit and high yield strength. High propor-

tional limit for a zinc-base alloy is in marked contrast with pure zinc and the more common alloys which have very low elastic properties.

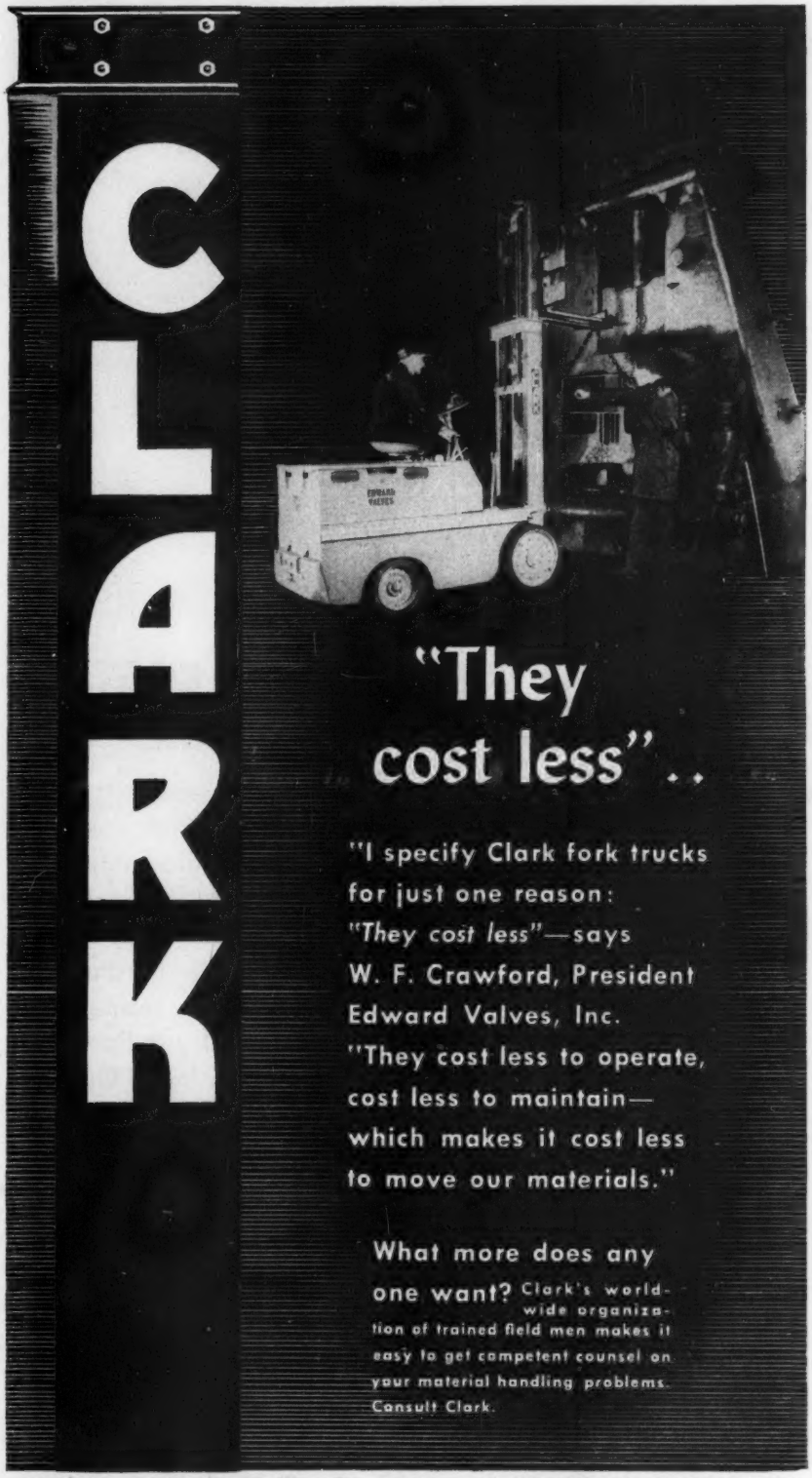
"Another patent which claims improved creep resistance is U. S. Patent 2,428,959, issued Oct. 14, 1947, to Edward J. Boyle and Edmund A. Anderson, and assigned to New Jersey Zinc Co. A narrow claim discloses about 0.1 per cent titanium and from 0.3 to 0.6 per cent of manganese, and the balance zinc. This patent discloses that the alloy has better creep resistance in the hot-rolled condition than as cold rolled, but the creep resistance of cold-rolled alloys is improved by anneal after cold-rolling."

Refractories Developments Curtail Furnace Delays

H. M. Kraner, ceramic engineer, research and development dept., Bethlehem Steel Co., Bethlehem, Pa.: "Advantages of low alumina brick have been well known in high temperature furnace construction, but its manufacture and use have been more or less confined to localities where the purer silica rock was easily available. Nowadays such brick has gone into general use to the extent that purer silica rock is being shipped long distances into a number of silica-brick plants to reduce the impurities of their product. Washing operations are also underway in order to increase the purity of silica rock for silica brick. It has recently been revealed that during the war the Germans also added silica sand to their silica brick compositions in order to decrease the impurity content. Brick thus produced is being used in "balanced" roofs of open hearths wherein entire campaigns in some cases are run without patching. Locations of severe wear, particularly in the skewback area, are being fortified with the brick of lowest impurity content.

"Carbon hearths in blast furnaces promise much toward the elimination of hearth failures due to shrinkage of clay hearth refractories and will no doubt establish more continuous furnace operation.

"Superduty and hard-fired brick are doing a good job in blast furnace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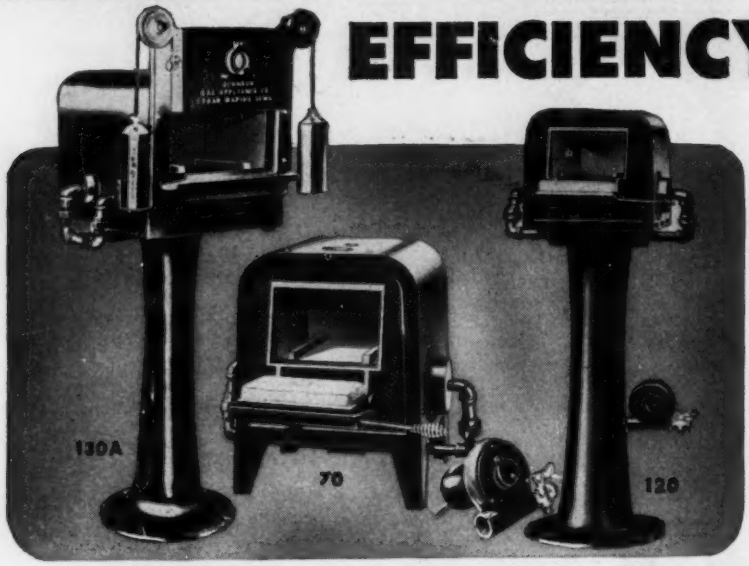

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stacks. Like in carbon hearths, interest in them is increasing from the standpoint of the operators who have not previously tried them and of producers who had not previously entered this field.

"All-basic and basic-end open-hearth furnaces are being tried in greater numbers. While their cost cannot be entirely justified on the basis of refractory life, increased production rates and decreased delays are making favorable showings possible. Suspension of the roof and other sections of the furnaces permit increased firing rates by opening up areas which are generally constricted in conventional furnaces. While such furnace developments are now directed toward decreases in delays, their success will speed the day when we shall be able to charge in a fraction of our present charging equipment. Such developments depend upon furnace designs which require basic refractories and suspending devices for holding them. The brick which appears to have been most successful in basic installations is approximately the same as it was about eight years ago when the present developments started. It will not be an easy matter to provide a more suitable refractory for this purpose, but the future of the all-basic furnace depends largely upon a better brick.

"Use of oxygen in the open hearth is being watched from a refractories standpoint, and the use of basic brick becomes more and more necessary with increased use of oxygen.

"American Iron & Steel Institute through its Refractories Committee is paying considerable attention to the simplification of refractory shapes, particularly pit refractories, and toward standardization. It is their hope that all manufacturers will eventually aim for the nominal dimensions of a 9 x 4-1/2 x 2-1/2 or 9 x 4-1/2 x 3" standard brick."

Market for Stainless Equipment Becomes More Diversified

Walter D. Monroe, president, Chicago Steel Service Co., Chicago: "The prediction that 1947 was to be a boom year for stainless has proved true. More stainless steel in all forms is being used than ever before. Mills report a current operating rate in excess of 700,000 annual ingot tons.

"Improved fabricating techniques have done much to make this growth possible. Better welding methods, particularly shielded arc welding, are helping to produce better products. Deep drawing is being done today

which would amaze the early developers of stainless. Skillful fabricators are doing a beautiful job, but finishing continues to be one of the principal subjects for attention. Electropolishing is helping reduce costs of wire products; improved ball burnishing aids small parts production; various plastic coatings and improved protective papers are helping sheet metal fabricators.

"Stainless clad plates in thicknesses 3/16 and over are going into wider use, especially in heavy tank work. The relatively smooth finish of plates treated by the newly developed processes—other than pickling and sand blasting—offers a considerable improvement.

"Excellent fittings of new types in a full range of grades and sizes for both pipe and tubing were introduced commercially in the past year."

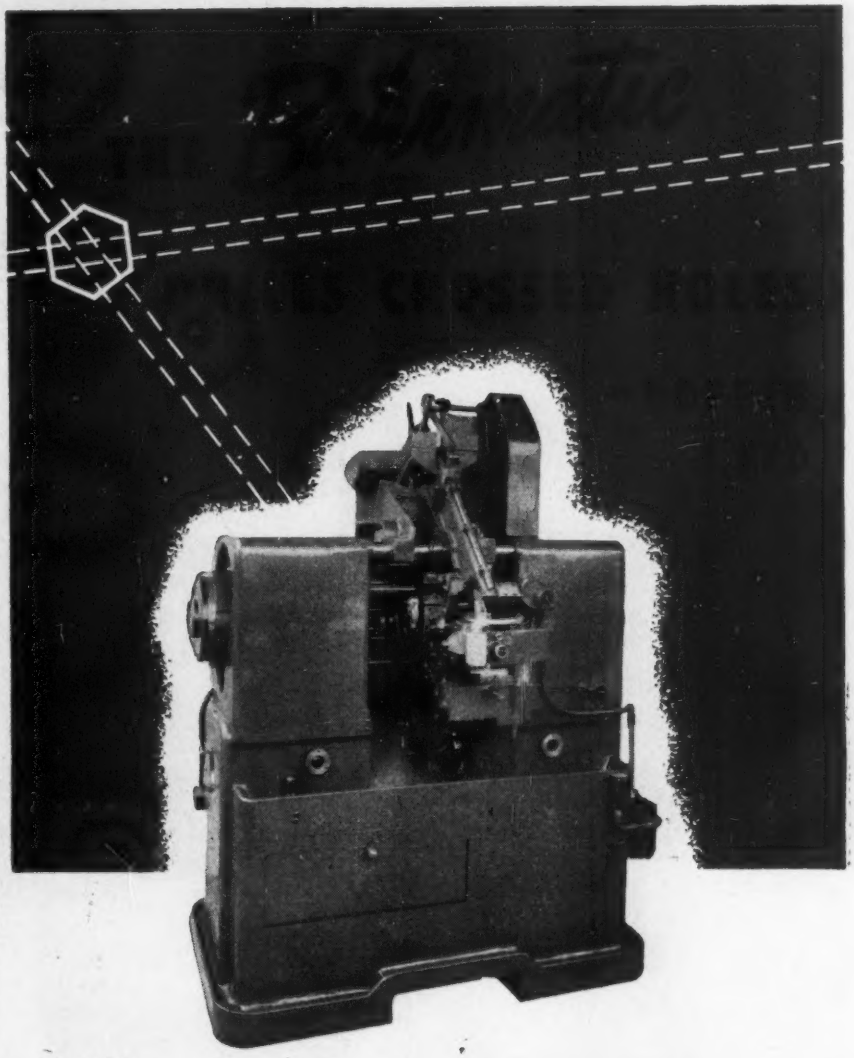
Nitre Cake Changes Complex Of Cleaning House Practice

Kenneth B. Lewis, consulting engineer, Worcester, Mass.: "Recently I came across a memorandum in my files dealing with a summary of the state of the wire industry in 1915. In it was mentioned that a curious nitrogenous substance called nitre cake was being used in Europe as a substitute for sulphuric acid, which in turn was going into munitions and yielding this substance as a by-product. It seemed to have an inhibiting effect and I wondered whether it might be the beginning of something interesting.

"The memorandum went on to say that the mills seemed disinclined to go as high as $400 a block for good rod benches. It mentioned the use of continuous drawing machines in England, brought about by inconsistencies in the rules forced upon the industry by labor unions, and that we in America were little likely to encounter either continuous drawing or labor unionism.

"Well, the nitre cake touched off a chain reaction in the cleaning house. The price per block currently paid for drawing equipment, when you can get it, is nearer $4000 than $400. Both continuous drawing and union labor have come in, and both practically dominate the field.

"Nothing has happened in a century to compare with the impact of the carbide die on the wire industry. Many details which might be thought to be advances in practice are merely the inevitable results of the use of carbides."



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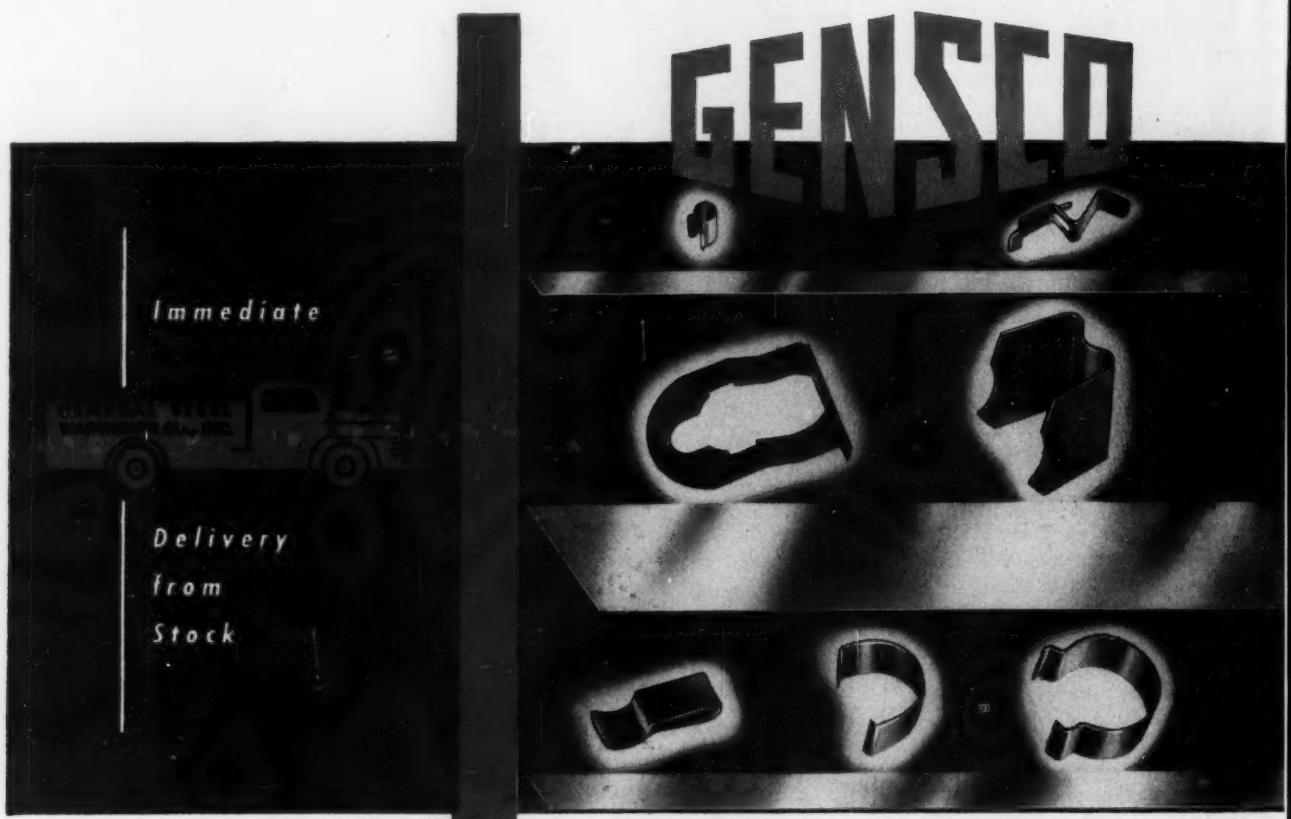

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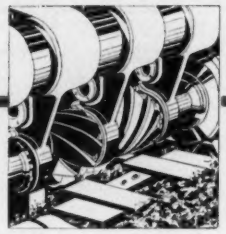


Machining

Bold "top" decisions needed to lower operating costs. . . Better equipment, better selling twin keys to inflation. . . Rising costs demand better processing and handling. . . Tool engineer seen as industrial "statesman"

Ingenuity of Machine Tool Builders Revealed at Show

George H. Johnson, president, Gisholt Machine Co., Madison, Wis.: "The 1947 Machine Tool Exposition gave a most illuminating view of the progress in the machine tool industry made during and after the war. Very notable strides were apparent in the development of much new automatic equipment. Automatic handling of a variety of pieces, development of contour attachments for many types of machines, and much greater rigidity were among the interesting accomplishments.

"In my opinion this points the way in the future to greatly reduced labor cost plus greater accuracy and cost of output, which will greatly increase the savings made by the installation of new machine tools."

Push-Button Control Makes For High Quality Workmanship

Louis Polk, president, Sheffield Corp., Dayton, O.: "Improvements of far reaching importance have been made in machine tool design and construction, as well as in tooling and the perfection of better gaging methods and devices. Developments cover a wide variety of changes, starting with materials that now provide higher tensile strength and wear resistance. Great advancement has been made in more precise manufacturing techniques. New electrical circuits are contributing to speed variation and other elements of control. Today, horsepower capacities of many types of machine tools are stepped up far above prewar models. Cutting tools and abrasive wheels are better. Many machine tools have been developed to more efficiently perform certain tasks on a higher production basis.

"Probably the most noteworthy accomplishment is what might be termed 'push button control.' The machine does more and better work, while the operator has a safer and easier job with increased pay. There is greater assurance of uniform high quality workmanship.

"Gaging has kept pace with the growing needs of industry, and much progress has been made in controlling the quality of manufactured parts to substantially lessen waste and reduce costs."

Predicts Era of Technical Changes in Manufacturing

Frederick V. Geier, president, Cincinnati Milling Machine Co., Cincinnati: "I believe we stand at the threshold of a period of extraordinary technical changes in manufacture. The necessity to lower unit costs, while paying high hourly wage rates, is now clear to all. Fortunately, there are now available many advances in machines and methods to cut costs and increase output, as well as to make simple and economical many operations which were formerly difficult and costly. Steel cut almost like light metals, work pieces handled mechanically in hundredths of a minute, automatic and tracer controls of shape, position and size, tolerances cut still finer, finishes to millionths of an inch, localized heat treatment precisely controlled within ten degrees; these and other advances have only begun to be put to general use.

During the next decade we should see accelerated application of such new techniques in industry generally."

Carbide Tool Design Aided by Mechanical Holder

Philip M. McKenna, president, Kennametal Inc., Latrobe, Pa.: "Among typical advances made last year in application of cemented hard carbide, was the development of a new principle in carbide tools for machining of steel and cast iron parts in automatic lathes, turret lathes and Bullard Multimatics. Another development during the year was the use of our tools for turning hard chilled iron rolls for steel mills. Outstanding feature of these tools was the use of a principle which has been found so effective in carbide tool design, namely, elimination of brazing and consequent brazing strains, holding the cemented carbide tips entirely by mechanical means."

Trend to Reduced Handling Time Instead of Reduced Speed

Charles J. Stilwell, president, Warner & Swasey Co., Cleveland: "The machine tool industry has given added emphasis in its engineering developments since the war to increased output. This emphasis has been spurred on by pressure from war weary shop employees and the growing tendency to put forth less physical effort. Definite advances in productivity of practically all types of machine

tools were evidenced at the machine tool show in Chicago. For the most part reduced handling time instead of increased speed of metal removal is the direction of this emphasis and, of course, when there is reduced handling of a machine tool, lessened operator physical effort results.

"New electric controls, new hydraulic applications and combinations of both are to be seen on all types of machine tools. These accomplish higher production and increased output per unit of time while requiring less skill and less energy on the part of the operator.

"Due to this trend a problem of higher machine tool prices is very evident. Complicity of mechanism and involved new control units bring about definitely higher costs to the machine tool builder. This, in turn, brings into high relief the need for the best in salesmanshinp."

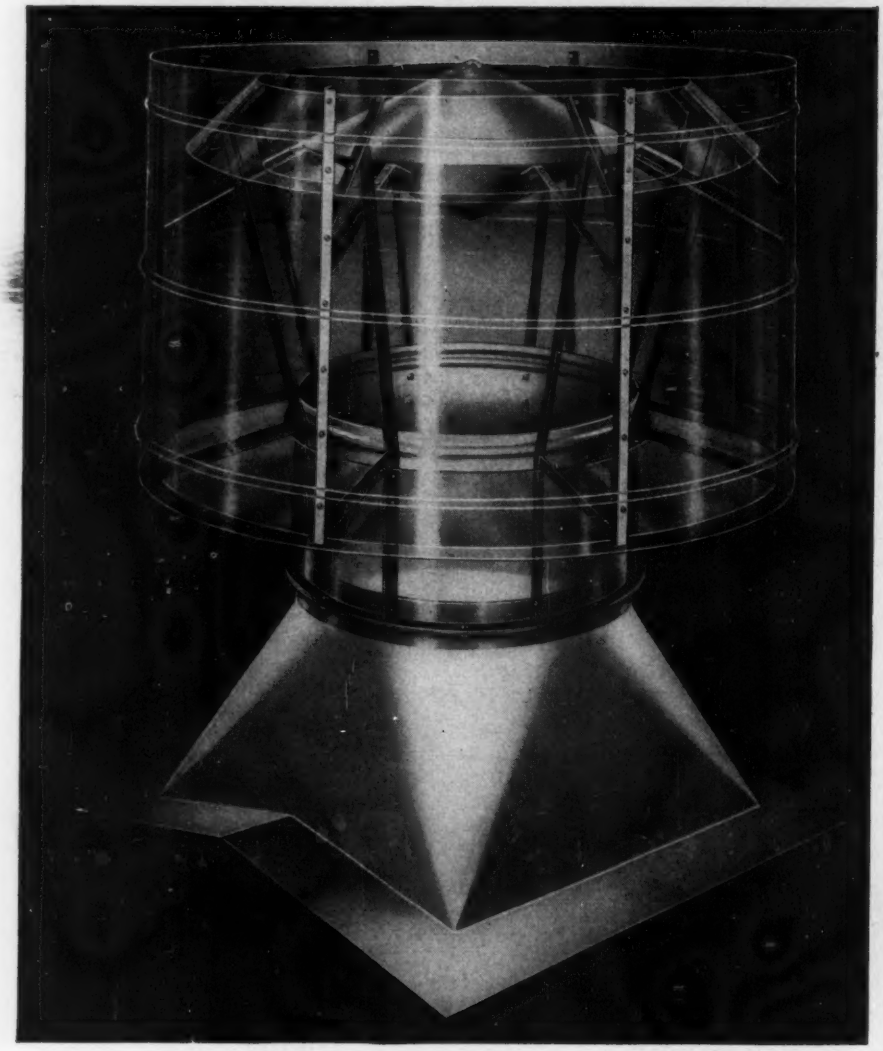
Good "Housekeeping", Efficiency Aim of New Machine Designs

F. J. Lapointe, president, Acme Broach Corp., Lexington, Ky.: "In designing machines, machine tool builders are endeavoring to give consideration to factors that enable them to become an asset to the shop—both from the standpoint of good 'housekeeping' and operating efficiency.

"Exteriors, for example, are being stripped of exposed pipes and unnecessary projections; motors, pump valves and all other electric and hydraulic components are being made more easily accessible for servicing. Effective use also is being made of direct coupling drives between motor and pump, and both of the latter are being mounted so they are readily removable. Much consideration is being given to the use of hardened ways on horizontal machines—quite a bit aboye the center line of the broaching tool—to avoid chips, especially cast iron chips—to keep them from dropping on the ways. Another current consideration is the use of built-in lighting for the work areas of the machines."

Sees End of "Rule-of-Thumb" Machine Tool Design Methods

R. J. Johnson, director of engineering, Ingersoll Milling Machine Co., Rockford, Ill.: "In the following brief remarks I purposely limit myself to the broader aspects of today's outlook for machine tools. Never before in my experience has there been a time when more people were interest-



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ed in labor saving devices. Everyone from the machinist to the top business executive are seeking ways to produce more with less work. Consequently, there is more opportunity for industrial application of advanced machine tools than before.

"Progress is being achieved today in the same manner as it has been in the past, but at much more rapid rate. Thorough and intensive studies of the problem based on practical experience, followed up by the highest type of engineering and a lot of carefully directed hard work, are producing results that a few years ago would have been considered miracles. Proper engineering approach to machine tool problems is the most important step because it is basic to all others in this day and age when old fashioned 'rule-of-thumb' methods of design are 'out' in the metalworking field."

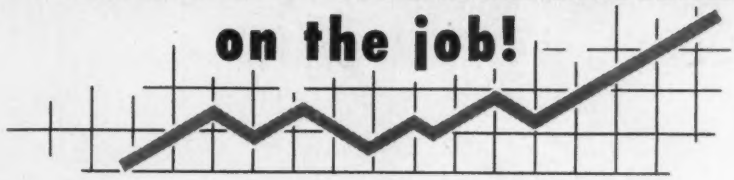
Carbides Not Limited to Nonpercussive Applications

W. G. Robbins, president, Carboloy Co. Inc., Detroit: "Probably the most vital development in the hard metals field during the past year was the definite demonstration — in a variety of applications — that cemented carbides are not limited to nonpercussive uses. There probably is no service in which the ability to resist shock is more important than in rock drilling. Yet, during the past year, we have found that carbides—when properly applied—are able to withstand the constant hammer blows of drilling through the hardest of rocks.

"Carbide rock drills, as a result, are now in mass production by one of the nation's leading mining equipment producers. Again, in the metal stamping field, we have repeatedly found that carbides are able to stand up under repeated blows.

"Developments such as these require a complete revolution in our thinking with regard to cemented carbides. We now know for instance that there is no fundamental reason why carbides cannot be used even in rock crushers and similar applications where ability to resist impact is almost the primary consideration.

Production Going UP WITH OSGOOD MOBILCRANES on the job!



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Other new fields opened up to carbides include the oil well industry, an enlarged scope of usefulness in the punch and die field, and such applications as dies for cold-heading, swaging, forging, etc."

Trend Toward Greater Use Of Carbide Tools Noted

R. R. Weddell, Weddell Tools Inc., Rochester, N. Y.: "The Machine Tool Show exemplified the progress in carbide tooling. Most every machine tool exhibited was using cutting tools made of this material. For obtaining maximum output at lowest cost, carbide is mostly replacing high speed steel and cast alloy tools, particularly where the tool shape may be easily formed and renewed. The tool setups at the show were incorporated on up-to-date machine tools offering ample power and rigidity.

"However, many users are now endeavoring to use carbide on their older machines. They are finding that practical compromises can be made to take advantage of this superior cutting material. Modern design offers practical and economical carbide cutting tools, useful for not too old machine tools. The part to be machined must be quickly and accurately located. To back up the surfaces which are finished, there must be supports for the cut to eliminate any deflection caused by the cutting tool. Speeds and feeds of the tool or work should be adequate to take full advantage of the carbide. Power must be added to the drive to obtain more metal removal per minute. Also, tools must be maintained accurately."

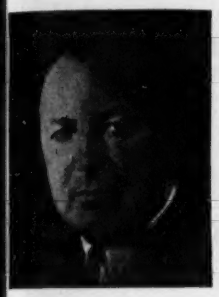
Mechanical Hob Shift Promotes Precision in Hobbing Techniques

Ralph L. Cotta, machine tool division, Barber-Colman Co., Rockford, Ill.: "The automatic hob shift which is actuated hydraulically at the end of a cutting cycle seems to be one of the mechanical developments of outstanding value in hobbing technique. The distribution of wear along the face of the hob tooth is uniform and in shifting, the amount of stock required to be removed is not as great

as that in manual shifting at the position of wear increments. The result is that the wear distribution increases the production per sharpening as well as increases the life of the hob due to greater number of sharpenings. Precise hob sharpening as produced on one our new automatic sharpening machines proved very valuable in the control of the finish on precision gears."

"Idle Time" Must Be Studied To Achieve Cost Reduction

O. L. Bard, president, Michigan Tool Co., Detroit: "During the coming year, the biggest job facing the metal working industry in order to reduce costs is to reduce the receiving-dock-to-shipping-platform time rather than the cycle time of individual machines. Modern machines have now reached a rate of productivity as to cycle time where little reduction in overall cost can be achieved through further increases in cutting speed until non-productive time can be reduced. Involved here are such factors as loading time; down time for tool changes; methods of getting parts to and away from machines; and arrangements which will reduce the number of times a part in process has to be handled.



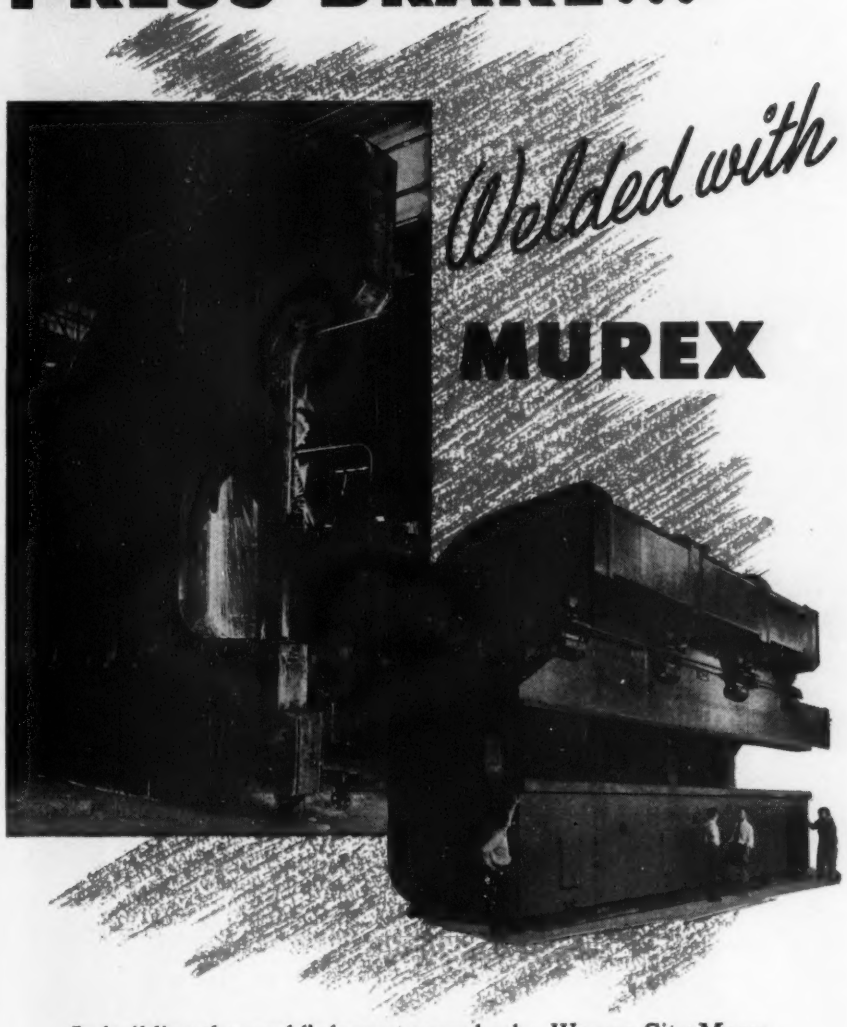
"This does not mean that new machines must be single-purpose and highly specialized. It does mean that more attention—either in the machines themselves or in the design and arrangement of accessories and materials handling units — must be given as much idle time as possible.

"To attack the problem properly, it is a good idea to analyze 'idle time' from the standpoint of the part itself."

First Postwar Advancement in Overall Design Noted

H. B. Newton, president, Rockford Machine Tool Co., Rockford, Ill.: "New and improved machine tools, now available, represent our first major advancement in overall design since before the war. Dimensional changes have been made in rail, bed and column to provide heavier and more rigidly constructed machines.

WORLD'S LARGEST PRESS BRAKE...



In building the world's largest press brake, Warren City Manufacturing Company made sure of top quality welding by using Murex Electrodes.

This huge unit, of fully stress-relieved welded steel construction weighs more than a half million pounds without dies. It is designed to exert a pressure of over 1,000 tons for bending steel plate ⅝" thick to a right angle and in a single stroke in lengths up to 36 feet.

Manual welding involved the equivalent of 40,000 feet of ¼" fillet welding requiring more than ten thousand pounds of GENEX, FHP and HTS rod.

M & T can be of help to you . . . Ask for a representative to call and check over your welding operations.

METAL & THERMIT CORPORATION
120 BROADWAY • NEW YORK 5, N. Y.

MUREX WELDING ELECTRODES
M&T ELECTRODES and GAS RODS
M&T WELDING ACCESSORIES

High Costs Under Low Ceilings

When plant ceilings are low, material handling costs may skyrocket, especially if loads are heavy and movements frequent. If yours is a plant where there isn't headroom to install and operate a conventional type electric hoist, there's an answer to the problem — and a Shepard Niles engineer has it.

Show him what you lift and move. He's a trained, experienced man and from the multitude of sizes and types of electric hoists made by America's pioneer builder, he'll recommend the best type of close clearance hoist to do your job economically, smoothly and safely.

Every Shepard Niles hoist has sound design, rugged and precise construction and trouble-free operation built in. The "plus" you get with a Shepard Niles is the right style and installation for your own needs.

★ If your handling problem involves an overhead traveling crane instead of a hoist, Shepard Niles will suggest the right type. There's a Shepard Niles crane for every material-handling operation.

Shepard Niles
CRANE & HOIST CORPORATION

358 SCHUYLER AVENUE • MONTOUR FALLS, N. Y.

Heads are improved for more convenient handling.

"The 36-inch openside shaper has been completely redesigned; an improved side-head greatly increases the general usefulness of this machine tool; new dual controls for all major table movements enable table to be operated from either side.

"The new Hy-Draulic shaper is performing many types of shaper work that it is considered extremely difficult or impossible to do. Typical example: A key-way job 1/2-inch in length, where a clearance of only 0.008-inch is allowed at the blind shoulder at each end.

"We think that buyers of metalworking equipment will find in today's market, machines which ingeniously incorporate to an unequalled degree, the fundamental elements of accuracy, productivity, durability, and ease of operation."

Newly Designed Lathes "Powered for Carbides"

W. J. Grimm, secretary and assistant to general manager, Jones & Lamson Machine Co., Springfield, Vt.: "The term 'powered for carbide' has been brought forcefully to the attention of the metal turning industry during the past year. In addition to meeting these specifications, new developments for Jones & Lamson turret lathes include hydraulic operated bar feed and chucks for bar work and electric power operated chucks for chucking work. Provisions have been incorporated for heavier duty motors and additional chip room, as well as better facilities for removing the chips.

"On thread and form grinders, the matter of removing vapor and oil fumes generated by large diameter, high speed wheels has been a problem. An enclosure for the grinding wheel motor, wheelhead and slide, combined with a new type of either hand or hydraulically operated splash guards, offers a complete enclosure from which the oil vapor is removed and passed through a series of filters which salvage a high percentage of the oil, returning it to the coolant tank. Any oil vapor or smoke passing beyond the filter plates is burned

electronically, thus returning practically clean air to the room or building in which the machine is used.

"We enter the new year with a completely redesigned line of optical comparator and measuring machines including two new models."

Automatic Equipment Points Way to Reduced Labor Costs

J. G. Johnston, general manager, IBM World Mfg. International Business Machines Corp., Endicott, N. Y.: "The National Machine Tool Show in Chicago last September demonstrated the ingenuity of American machine tool builders in meeting the demand for speed and greater accuracy. Minutes are becoming more and more valuable as machines now are turning out parts in seconds that formerly required minutes. These trends are of real interest: 1. Greater power; 2. Greater rigidity; 3. Power meters on machines to show power consumption (Believe this will become standard on all machines); 4. Greater use of carbides; 5. The greater use of antifriction bearings; 6. Automatic guarding for safety by using transparent plastic. Elimination of eye injuries and improved visibility; 7. Hardened and ground ways; 8. High speed stamping; 9. Greater accuracy in machine tools and better finishes."

Modern Machinery Urgent Economic Necessity

J. Y. Scott, president, Van Norman Co., Springfield, Mass.: "One of the most urgent necessities in American economic life today is the installation by manufacturers of the most modern machinery available at the present moment. With hourly wage rates at unparalleled levels it becomes a must to secure maximum hourly production for every wage dollar. The machine tool and related

if

H & S SPEED REDUCERS

could be brought to your desk..

. . . so that you could examine them, you would quickly recognize these outstanding advantages . . . 1. Ultra-simple in design. 2. Accurately cut gears with heavier, wider faces. 3. Anti-friction bearings. 4. Shafts and bearings oversize. 5. Heavy, ribbed, dust-tight housings. 6. Splash lubrication.

The Horsburgh & Scott line is complete . . . a speed reducer for every industrial purpose . . . each with its definite advantages.

Send note on Company Letterhead for Speed Reducer Catalog 46

THE HORSBURGH & SCOTT CO.

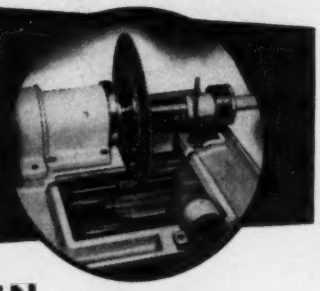
GEARS AND SPEED REDUCERS

5112 HAMILTON AVENUE • CLEVELAND 14, OHIO, U. S. A.

Cuts under water

ELIMINATES

BURRS • BURNS • SCRATCHES



"PRECISION"

SUBMERGED SPECIMEN

CUT-OFF MACHINE

Specifically designed for the important job of cutting off metallurgical specimens for microscopic examination without disturbing the structure of the material . the "Precision"-Jarrett Submerged Specimen Cutter is the only machine which completely submerges both wheel and sample in water during the cutting-off operation. It produces a perfect cut-off surface, free from burns, scratches and grain distortion . ready for mounting and polishing without intermediate grinding. Features of this model which contribute to perfect results are underwater cutting, slow-speed wheel and the specially designed vise, engineered to hold the sample rigidly in position. A strong, stable, self-contained unit, this specimen cut-off machine is built for precision work under safe-operating conditions. Another excellent example of "Precision" engineering. Write for Metallurgical Bulletin No 850-S.

See Your Laboratory Supply Dealer

Precision Scientific Company

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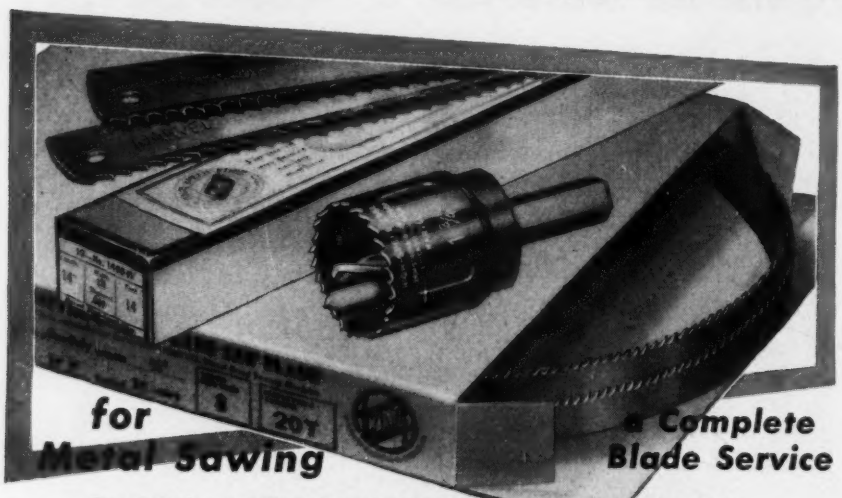
Scientific Vacuum and Production Control Equipment



Any metal saw will perform better with MARVEL BLADES because:

MARVEL High-Speed-Edge Hack Saw Blades are both high-speed and *positively unbreakable*. Composite construction (high-speed-steel cutting edge welded to tough alloy body) permits higher cutting speed, heavier feeds, tauter tensioning and assures long blade life.

MARVEL High-Speed-Edge Hole Saws have extra strength needed for drill press and lathe use. Rapidly cuts holes from ⅝" to 4½" dia., to depth of 1⅛" in steel.

MARVEL Band Saw Blades come individually boxed—protected against kinks or rusting—to exact size for each make and model sawing machine.

Write for MARVEL Saw Blade Catalog.

MARVEL *Metal Cutting* SAWS

Better Machines-Better Blades

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave. Chicago 39, U. S. A.

industries at the Chicago-Dodge Plant last fall demonstrated to the metalworking industry, machines that will, if purchased and installed, go a long way towards once again securing low-cost production on many items.

"It is the writer's hope that managements, who, during the war were fortunate enough to secure amortization of facilities, will keep these facilities at high productive levels by spending of the full depreciation allowances plus further substantial sums to win what has been called the 'battle of production against inflation.'"

Circuit Breakers Provide Manual Disconnect on Machine Tools

L. W. Herchenroeder, industry engineering department, Westinghouse Electric Corp., East Pittsburgh, Pa.: "A growing trend in machine tool controls is the use of circuit breakers to provide a manual disconnect and overcurrent protection for the electrical circuits on machine tools. Additional safety is provided with the breaker as a fault on any phase will cause all phases to be opened, thus preventing the spreading of the fault to other phases.

"Normally the breaker is used with a thermal element to provide inverse time limit trip for moderate overloads and an instantaneous magnetic trip for heavy overloads or short circuits. Frequently the thermal trip is omitted and an adjustable magnetic trip only is used. This permits using the same breakers for a number of horsepower ratings, thus reducing the number of breakers that must be stocked.

"An involved variable voltage planer drive has been developed to utilize the higher cutting speeds permitted by carbide tools."

Machine Tool Users More Speed Conscious Than Ever Before

William L. Dolle, president and general manager, Lodge & Shipley Co., Cincinnati: "A good many men at the Machine Tool Show expressed the opinion that 'They were going home far more speed conscious than ever before.' This observation to me

has rather far reaching possibilities. While all of the more aggressive companies have adopted and developed techniques of using cemented carbide tools, apparently there has not been a universal adoption of these tools.

"However, there are still hundreds of shops throughout the United States which are not using the cemented carbide tools in their plants. If the men who attended the show went back home and attempted to apply the methods they saw in use there, they undoubtedly found that they were not successful. These carbide tools require speed, and speed demands horsepower. It is only with the modern machines exhibited at the show that these speeds and horsepowers can really be attained."

1947 Seen as Outstanding Year in Art of Cutting Metal

A. C. Bryant, president, National Machine Tool Builders' Association, Cleveland: "When at some future date, books are written on the history of the machine tool industry, they will point out, without question, that 1947 was one of the outstanding years in the advancement of the art of cutting metal. Such a text book summary might perhaps read something like this:

'At the Machine Tool Show of 1935 were displayed new models which exhibited the full measure of progress made since the first World War.

'Shortly thereafter the threat of war in Europe brought demands for increased output—and this situation became accelerated first with our own national defense program and then with our entry into the second World War. With emphasis on nothing but volume, designs were frozen. Improvements that had been in the drawing board stage before the war were put aside as the threat of Hitler became evermore acute.

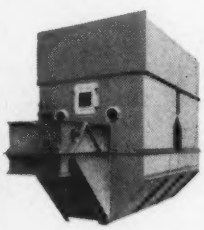
'After V-J Day, the whole machine tool industry set to work to do the job of redesign and development that had been postponed for 10 long years—with the end result that at the Machine

Eats DUST and FUMES from YOUR production

Schmieg CENTRI MERGE DUST and FUME Eliminator

AUTOMATICALLY

- COLLECTS —at point of origination.
- CLEANS —by high pressure water action.
- DISPOSES —by mechanical conveyor in the form of sludge.



Like a huge octopus, with its tentacles (ducts) reaching out to every working area where contamination of air occurs, the Schmieg CENTRI-MERGE Eliminator sucks up and consumes all dangerous dust and fumes—literally eats them up.

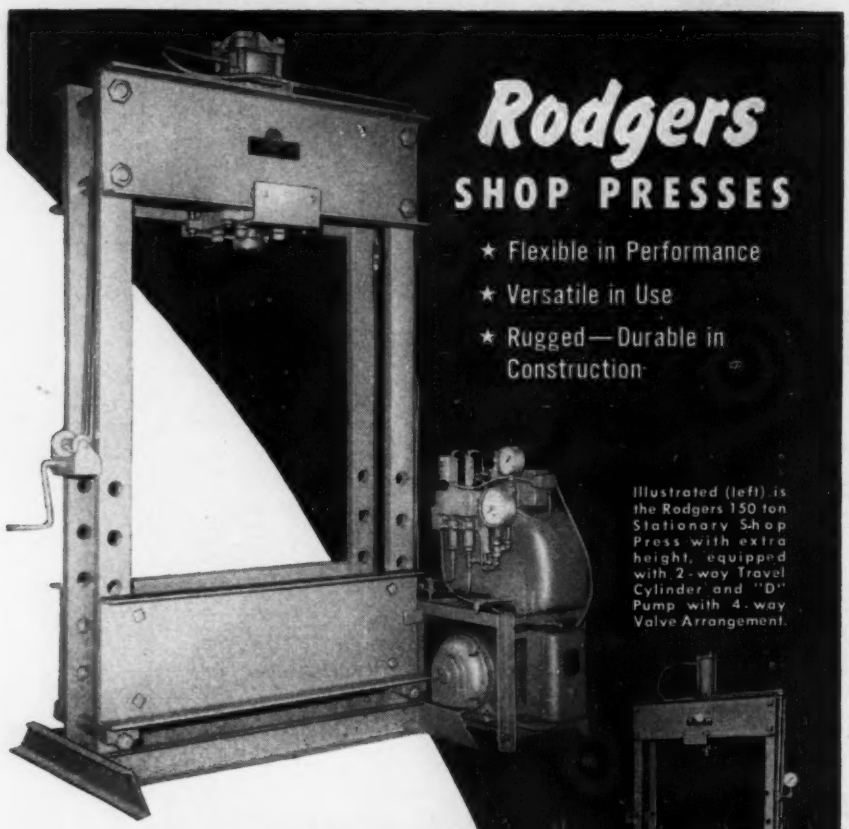
Picked up at the point of origination—BEFORE *any damage can be done*—dust and fumes ride an air stream through the ducts to the Collection Unit. Here CENTRI-MERGE goes into action—washing—scrubbing—pounding out the dust and dirt in a tornado of cleansing water. Dust particles are deposited—under water—in a sludge tank at base of Unit.

Right now — today — CENTRI-MERGE Eliminators are removing the hazard of dust and fumes from scores of plants—doing a more thorough job than any other method—and doing it more economically. We welcome the opportunity of proving what CENTRI-MERGE can do for you.

THE best AIR PURGE is CENTRI MERGE

Schmieg INDUSTRIES INC.
Engineers & Manufacturers

298 PIQUETTE AVENUE • DETROIT 2, MICHIGAN



Rodgers
SHOP PRESSES

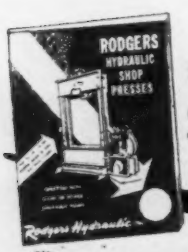
★ Flexible in Performance
★ Versatile in Use
★ Rugged—Durable in Construction

Illustrated (left) is the Rodgers 150 ton Stationary Shop Press with extra height, equipped with 2-way Travel Cylinder and "D" Pump with 4-way Valve Arrangement.

For tough service and maintenance work in pressing, squeezing and forcing, there is a Rodgers Press to meet your requirements. These rugged, flexible shop presses are available in 60, 100, 150 and 200 ton sizes. (300 and 400 ton capacity presses are available upon special order). They all embody the same proved Rodgers design and performance features: Bolster of press is raised and lowered by a hand crank . . . special alloy steel pins can be adjusted to allow desired opening . . . cylinders may be had with one way travel or two way travel in ram travel lengths from 6" to 14" as desired—frame construction is of strong, durable rolled steel plate. Power is supplied by self-lubricating hand pumps or power driven pumps.

Save time and labor on your jobs with a Rodgers Shop Press—the exact model that is best suited for your needs. You'll get prompt delivery on any standard model press.

The Rodgers "Sixty"—60 ton Shop Press (shown above) takes care of those miscellaneous jobs that waste so much time and labor. Available with hand operated pumps, or with gear head motor drive, also powered with "D" pump power unit.



✻ *Send for this catalog giving complete descriptions, illustrations and specifications of Rodgers Shop Presses. There's no obligation. Write today for your copy.*

Rodgers 100-ton Stationary Shop Press powered with 4-Speed Hand Operated Hydraulic Pump, also available with "D" pump power unit. Please note that on all presses the cylinder is movable across the entire width of press.

Rodgers Hydraulic, Inc.

HYDRAULIC POWER EQUIPMENT

Shop Presses · Crawler-Track Presses · Power Pump Units · Portable Presses

7423 Walker St., St. Louis Park, Minneapolis 16, Minn.

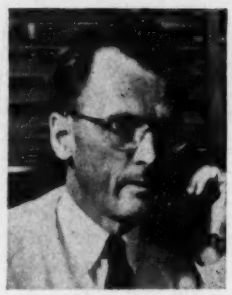
Tool Show in September of 1947 there was revealed a 12-year accumulation of advancement in the art of removing metal.'

"Yes, this is what I believe the text books of tomorrow will say, for I have been making a little survey of my own as to the machine tools displayed at the Show. My survey shows increases in efficiency ranging from as little as 10 per cent on a few types to as high as 500 per cent on some remarkable developments. I am convinced that an improvement of at least 33 per cent over prewar models is a conservative estimate. In short, the machine tools we can build today produce one-third more than those of prewar days.

"Right now when production, and still more production, is imperative, not only in order to get ever more goods on the domestic market and thereby halt the price spiral but also to give aid to Europe. These facts are vital to the American economy."

Diesetting Now Easy as Cranking Table of Miller

R. F. Moore, president, Moore Special Tool Co. Inc., Bridgeport, Conn.: "For unskilled, low-paid production jobs all kinds of handling devices are made for the comfort of the worker, and yet, our highest skilled and paid workers are expected to lift 200 or 300 pounds of dieset and horse it around from machine to machine as they put it through the various operations. When assembling large pillar dies there are, basically, seven distinct operations which must be performed in much the same manner from one die to another.



"Until recently, these operations were performed in tool rooms by using elevating trucks with wheels, chain hoists, pry bars, hammers (yes, hammers!) radial drill tapping machines, and, usually one or two men helping with die leader.

"With the development of a machine called the Die Flipper, the diemaker now simply slides the dieset on the bed of the unit, and any of the seven operations can be done in sequence, or out of sequence. The diemaker never requires the aid of a

helper, and he never excerts himself any more than he would in cranking the table of a milling machine a few inches.

Improvements in Hydraulic Systems Provide Longer Service

Silas T. Massey, vice president, Heald Machine Co., Worcester, Mass.: "We are putting on the market completely new models of internal grinding machines, surface grinding machines, and Bore-Matic precision boring machines. These incorporate certain outstanding developments. Our objective in these new models is to develop machines which give increased production, greater accuracy, better finish and less maintenance.

"A most interesting development is the uniform hydraulic feed which is now constant throughout the day regardless of oil temperature changes. This makes it possible to maintain predetermined rates of production, finish and accuracy, without attention of the operator.

"Great improvements also have been made in hydraulic systems. The foreign matter-proof hydraulic valve units are mounted on a plate within the base and a self-contained hydraulic power unit at the back of the machine and separate from the base are all easily accessible.

"All moving parts of the new machines are either permanently lubricated and sealed, or automatically lubricated by control pressure. The only manual lubrication necessary is the periodic lubrication of motors."

Multiple Spindle Automatics Permit Less Work Handling

H. P. Chaplin, treasurer and general manager, Cone Automatic Machine Co. Inc., Windsor, Vt.: "Similar to the history of any lathe is that of the multiple spindle automatic, whose development from a special purpose, machine to an accepted type of lathe with various standardized features now approaches a more universal application to general bar work. In operation it is a machine of duplicated effort in producing duplicate machined parts. The degree of consistency with which its automatic functions are repeated and maintained determines the machines performance rating. Growing up with the mass production, interchangeable era it has been a symbol of the phrase 'best in the long run and the long run counts.'

"The production advantages gained in savings from less handling of parts

The Right Wire for Your Product....

KEYSTONE WIRE

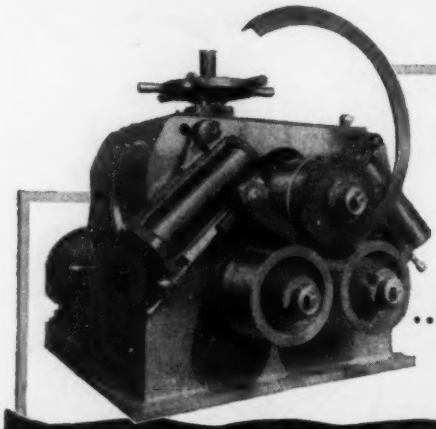
- Music Spring Wire
- Flexible Shaft Wire
- Pre-formed Staple Wire
- Tubular Rivet Wire
- Cold Heading Wire
- Spiral Binding Wire
- Rope Wire
- Galvanized Telephone Wire
- Gas Welding Wire
- Box Binding Wire
- Box Stapling Wire

The wire for your product may also deserve wire manufacturing skill and care far above that required for ordinary wire.

KEYSTONE MUSIC SPRING WIRE

SPECIAL ANALYSIS WIRE for all industrial purposes

KEYSTONE STEEL & WIRE COMPANY
PEORIA 7, ILLINOIS



If you have only
1 angle to roll,
you won't need it!

...BUT FOR PRODUCTION ROLLING, IT'S A "MUST"

THOMAS ANGLE-BENDING ROLL

Obviously one, two, six or even sixteen angles won't justify the purchase of this modern Thomas machine. But if your production calls for circles or segments from angles, flats, rounds or other shapes in quantities, the THOMAS ANGLE BENDER may be the solution to *your* need for *greater production at less cost!*

BULLETIN 314
describes the four sizes and is yours for the asking. Write for it now!

17

THOMAS
MACHINE MANUFACTURING COMPANY
PITTSBURGH, 23, PA.

PUNCHES
and
OTHER TOOLS

"NEW PROCESS"

PUNCHES—DIES • RIVET SETS
COMPRESSION RIVETER DIES • CHISEL BLANKS

Made from high-grade alloy tool steels properly heat-treated, of uniform high quality—may be purchased with complete confidence for maximum service.

SINCE 1903

WRITE FOR OUR NEW CATALOG 46

GEO. F. MARCHANT COMPANY
1420-34 So. ROCKWELL ST., CHICAGO 8, ILL.

has encouraged the development of the automatic along lines of greater flexibility of tool accommodation. Its increasing adaptability to more tooling applications has opened up an opportunity in the field of short and medium runs. Aware of this the builders of various makes have introduced in late models features to accomplish faster set-up and lessen change-over time between runs."

Largest Diameter Brass Rod Available for Fabricators

M. J. Mianulli, manager, customer service division, Titan Metal Mfg. Co., Bellefonte, Pa.: "During 1947 an increase was noted in the demand for large diameter brass rod. As a result, facilities were provided for the production of extruded and straightened rod up to 4¾ inches diameter and cast and turned rod up to 7½ inches diameter both to a tolerance of 0.010-inch plus or minus. If subsequent procedure requires the machining of small sections from long rods, then a tolerance of 0.030-inch plus or minus is available at a savings to the fabricator. Requirements of specifications S.A.E. 72, 73, 88 and A.S.T.M. B16, B21, B124 and B138 can be specified.

"Reasons for the popularity of this type material is attributed to the fact that brass, being the most easily machined of the common metals, shows a production ratio of better than four to one as compared with other materials. When machining brass, tool life is increased, less grinding and breakage is encountered and closer tolerances can be maintained in long continuous runs. In conclusion, brass presents a pleasing appearance, is rust resistant, lends itself readily to both electroplating and organic finishes."

Rising Costs Demand Better Processing and Handling

J. R. Weaver, works manager, Westinghouse Electric Corp., Springfield, Mass.: "In analyzing briefly the requirements of the metalworking industry, it seems to me that the machine tool and equipment industries have an extremely bright future pro-

vided, of course, that they meet the requirements. I make this statement in spite of the fact that there is an excessive amount of second hand manufacturing equipment on the market due to the large amount of machine tools and other equipment that were built during the war just concluded.

"Increased wage rates and material costs have required management to be continually on the lookout for better methods in manufacturing and handling. Even though, at the present time, it is possible to obtain higher prices for your product, it is the desire of every manufacturer to keep prices as low as possible so that a wide distribution can be maintained.

"Essential equipment industries must bring out facilities that will produce more at less cost."

Carbides Speed, Increase Accuracy of Many Machines

C. R. Harmon, Pittsburgh district manager, Firth-Sterling Steel & Carbide Corp., Pittsburgh: "Moving from a somewhat obscure position as a turning and drawing specialist, tungsten carbide metals have become the outstanding product responsible for a sane and progressive industrial revolution. It was carbide that signaled for faster, more rigid and accurate machinery. The machine tool industry is answering the challenge with units powered for carbide and geared for high production. Management, pressed for higher unit production to meet ever increasing labor costs, is turning more and more to carbide metals. In the nail mill carbide gripper dies, knives and quills have enabled management to reduce the number of set-up men to one-third and still have less work per man to perform. In the mines and quarries carbide chisel and undercutter bits and masonry drills are cutting to amazing depths without dulling or losing size. The bolt, nut, rivet, and fastening industry has found that carbide heading, extrusion, and boltmaker dies, cut-off knives and quills have reduced their tooling cost on high activity items so much that

MANY SHAPES, MANY FINISHES
. . . For Thousands of Uses!

Quality control at Seneca allows you to plan production without future worries about material variations. Iron, steel, low carbon, high carbon, tempered or untempered, aluminum and bronze wire are all produced according to the same high standard.

● *Shapes*
Square—Keystone—Flat-Round—Half-Round—Special Shapes—Straightened and cut.

●● *Sizes*
Number 40 W & M Gauge (.007) and larger.

●●● *Finishes*
Liquor Finish—Bright Galvanized—Coppered—Enameled All Colors—Annealed—Tinned—Oil Tempered.

●●●● *Thousands of Uses*

Aircraft	Cable	Hair Pin	Reed
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Armature	Clips	Hat Pin	Ribbon
Bee	Clock Spring	Heddle	Safety Pin
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Bobby Pins	Curtain Springs	Link Fabrics	Special Springs
Bonnets	Drapery Pin	Lock Springs	Spiral Binding
Bookbinders	Fish Hook	Mattresses	Stapling
Bottlecap	Fish Tape	Neeale	Stitching
Box Stitching	Florist	Picture Cord	Umbrella
Brooms	Fuse	Pins-Ropes	Valve Spring
Brushes	Glass Netting	Pin Ticket	Weaving
Button	Grape Tying	Piston Ring	Wire Cloth
	Gutter Broom	Plow Steel	

Save time and money by depending on Seneca Quality Controlled Wire to meet your specifications. Write today for quotation and delivery schedule.

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WIRE & MANUFACTURING COMPANY
FOSTORIA, OHIO — ESTABLISHED 1905
REPRESENTATIVES AND WAREHOUSES IN ALL PRINCIPAL CITIES

HELP *Speed* PRODUCTION SCHEDULES

with

DETROIT *— Power —* SCREWDRIVERS

Amazing speed—ease of operation!—Will drive standard machine screws, sheet metal screws, self-tapping screws with standard round, flat, binder, fillister, or hex heads and special heads.

DRIVES SCREWS AT ONE SECOND EACH

•

ALL SCREWS DRIVEN TO UNIFORM TENSION

•

NO MARRING OF HEADS

•

MODEL B PICTURED
drives screws from No. 6 to No. ¼ in lengths 3/16 to 1½ inches.

2 Other Models. Model A drives screws from No. 2 x ⅛ to No. 6 x ¾. Model C, from No. ¼ to ⅝.

Motorized HOPPER UNITS

Speedy Sturdy Dependable

USED WITH:

Presses, Centerless Grinders, Thread Rolling and Slotting Machines, or Soecial Machine. Made in 4 diameters, 10", 12", 16" and 24".

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MADE IN 4 DIAMETERS: 10", 12", 16", 24"

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tooling can be eliminated completely in estimating production costs. Straight hole rivet heading dies have produced over 50 million pieces with no appreciable wear."

Definite Trend to Automatic Sizing and Truing Sensed

C. D. Day, sales manager, Norton Co., Worcester, Mass.: "In creating new machines, the design engineer is guided by the several objectives. One of the outstanding aims is the accesibility of all mechanisms which are of prime importance to the user. A sincere attempt is made to consider the various functions performed by the operator for making his work easier. Control levers, push buttons and hand wheels are conveniently located at the operator's fingertips. Electrical equipment must be standard. The use of the manifolding has eliminated many feet of piping. Certainly this is a convenience to the user since it cuts down on the number of couplings, unions, fittings and bends in the piping system.

"There definitely is a trend to more and more automatic features on present day machine tools and two items which stand out in the grinding machine line are automatic sizing and automatic truing. The latter feature allows the operator to obtain a wheel truing merely by turning a selector switch and releasing two levers. Automatic work sizing devices have been further refined to satisfy those plunge cut production operations requiring a total tolerance of 0.0001-inch or less. This device operates many of the machine functions by its relationship to the work being produced. In other words, when size has been reached the wheel slide retracts and the operator unloads the machine and inserts the next piece.

"A very interesting application has been made in the lapping machine line through the introduction of a new type of prewaxed abrasive cloth as a means for surface finishing. Use of this abrasive cloth eliminates need for a coolant system. Another novel feature of this surface finishing machine is the elimination of hydraulic

and the introduction of pneumatic power, for the operation of certain functional steps in the finishing cycle.

"Multiple wheel grinding continues to gain favor as a possible source of producing more at less cost. It might be mentioned that machines with multiple wheel slides are still an accepted standard for grinding camshaft and crankshaft bearings."

Sees Increased Demand for New Broaching Equipment

Harry Gotberg, chief engineer, Colonial Broach Co., Detroit: "Developments in broaching currently are following two distinct trends. For high production industries the importance of reducing productive time lost in loading and unloading and during return strokes of machines is resulting in redesigns of equipment. One company has already finished the complete redesign of its broaching machines and basic fixtures, improved work holding, easier loading and an increase in productive operations which can be performed without requiring manual handling of parts. Automatic and semiautomatic broach handling are also coming into wider use. Further, special attention has been given to grouping of controls for operator convenience, accessibility of components for faster servicing and ability to service certain accessories without shutting down the machine.

"The second trend in broaching is the result of wider use of the process as a general purpose tool. Here the demand is for machines which are more suitable for shifting from job to job rather than being single purpose in character. A typical example is the provision of multiple spiral lead bars on one type of machine with a hand selector which permits the broaching at will of straight, left hand or right hand spirals. Fixture design has also been affected by this trend. An example here is a machine on which a very large part and a relatively small part can be broached by merely adding an insert to the main work holding fixture. Among new fields in which broaching is becoming more

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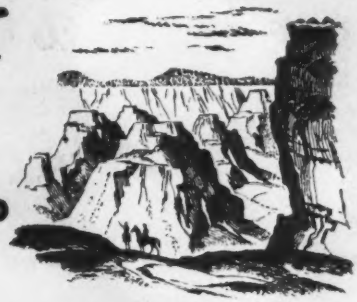

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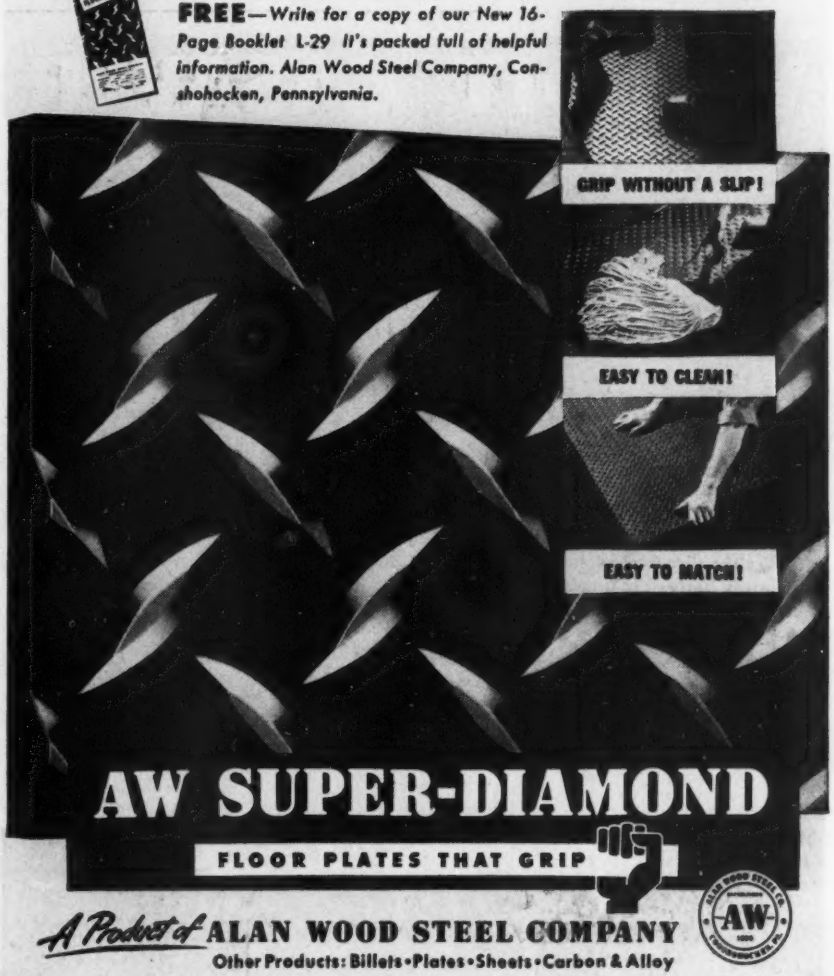

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to Close Tolerances

As a result of its wartime activities in manufacturing gun parts, which brought the Army-Navy Award with three stars, the Hendrick plant now has surplus facilities available for making small to medium size precision products to close tolerances. In fact, it is common procedure for Hendrick's experienced machine tool operators to work to a tolerance of .0005 inches.

If you will submit specifications and samples of products on which you wish quantity prices, we will quote promptly.

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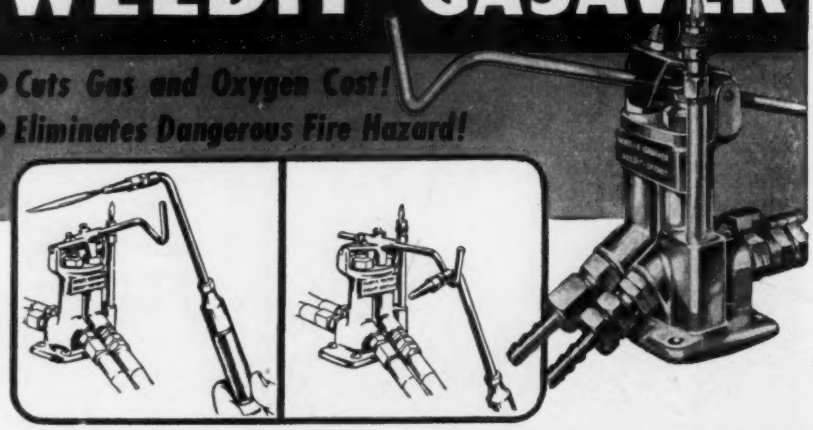


With Weldit Gasaver installed the operator simply hangs his torch on the handy lever rod of the Gasaver. The weight of the torch pulls the lever rod down, closing the valves of the Gasaver, thus shutting off both gas and oxygen intake lines. The usual idle flame and needless waste of oxygen and gas between operations is thus eliminated—no fire hazard or danger of injury to workers.

When the torch is again picked up for further welding operations, the operator passes it across the pilot light of the Gasaver, thereby instantly igniting the torch at the preadjusted flame, ready for work—no adjustments to make.

Gasaver can be installed any convenient place on the line between regulators and torch. Most of America's largest production plants are now Gasaver equipped.

Listed as standard by Underwriters' Laboratories and by New York City Board of Standards and Appeals.

Some distributor territory still available.

996 OAKMAN BLVD. **Weldit** INC. SINCE 1918 DETROIT 6, MICH.

widely used are the finishing of die castings and aluminum castings. Here broaching is even used to remove the flash where surfaces must fit together fairly accurately. An important industry in which such work is being done is the outboard motor field."

Tools Must Be Designed Right, Made Right for Specific Use

S. B. Hellstrom, general manager, Detroit Tap and Tool Co., Detroit: "If it were necessary to prove that there is no such thing as 'going back' or even 'standing pat' in the metal working industry, the last year has provided that proof. As little as two years ago, there were many who shook their heads at the idea of building jet engines in mass production. It couldn't be done, yet today it is being done. We now have the know-how, and it is a new know-how based on discarding accepted standards and going back and re-analyzing our fundamentals.

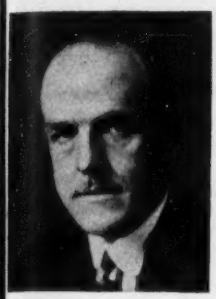
"Today's trend toward specialization in machine tools—industry's major weapon in fighting the war against constantly rising costs—presents a challenge to the manufacturer and designer of tools that cannot be answered with yesterday's tools. Time after time we find it necessary to go back to the elementary concepts of tool design and construction and study a problem from the tool steel on out.

"This is just as true of taps, thread milling cutters and thread rolls. While a standard tap of today may resemble the standard tap of yesterday the two are not similar. Each of these taps has something new—perhaps a new type of steel, a different heat-treatment, a minute dimensional change here or there—all things being based on a new know-how acquired by tackling individual problems with an open mind. Frequently we are thus able to improve one product—such as a standard tap — by adapting to it discoveries made in working on a special installation.

"Our modern trend toward getting more productive effort out of the machine instead of the operator has narrowed the range with which one tool or one machine can be applied

with maximum effectiveness. That allowed yesterday is too costly today."

Further Gains in Automaticity Seen Through Use of Electronics



E. P. Blanchard, director of sales, Bullard Co., Bridgeport, Conn.: "Last year in the field of automaticity—increased application of the automatic cycle to several types of machine tools, the emphasis was definitely on a further extension of mass production. The faster cycles in this field of work and the faster cutting are of course, producing more chips which, though previously an annoying problem, now reaches the point where means for disposing of them must definitely be included in machine design. The faster cycles however, are also pressing hard on any operator who must perform his function in tune with the cycle. This factor is even more important to include in the design or accessory to it.

"Machine tool builders in general have not been too eager to include means for such function, but it is feared that from now on they are going to be a very essential part of the successful operation of such equipment. Such intensified production has always depended seriously on tool life, or the facilities of changes and equipment in tool setting to accurate size, and since modern equipment is now carrying more eggs in the same basket, it is interesting that means apparently are being provided in the tools themselves, in tool block design, and in facilities within machine design to increase effeciency.

"A further observation is that a great many of these means are being extended to designs for equipment in machines for lesser, or medium volumes. It is natural that machines for medium ranges of production should in general, include facilities for a broader scope of work, which means wider ranges in the factors involved, including size of work, speed and feed of cutting, variety in direction and control of cutting, and still all under an automatic cycle. Such control, and particularly automatic control of a broad scope, means a multiplication of facilities, but it

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SHEAR BLADES
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Any type or size blade of proper Alloy with correct hardness and temper for every type shearing machine and every kind of job.
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Rx ENGINEERED TO THE JOB
Every Wapakoneta blade is made to exact specifications, designed for the particular job. Complete records with order number of each blade makes possible duplication of exact size and temper at any time.
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Shear Blade Specialists Since 1891
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Cold RIVETING
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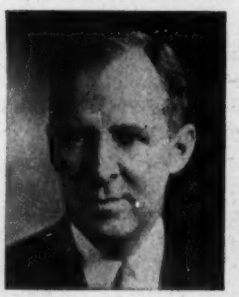
does mean that automatic operation is becoming even more universal.

"Special machines in the machine tool field for single-purpose operation, and many other types outside of machine tools have for years included standardized means for performing an inflexible series of functions automatically. Some mass production machines have included flexibility of the factors for a number of years, and are the accepted method for a more or less designated field in which such designs are universal.

"I'm somewhat intrigued however, by the application of electronics. At this point let me remark that to most engineers, electronics has not yet got out of the 'mystery box' category, and probably this accounts for the only limited application that has been seen up to date. But control of direction of feed as exists in the electronic contour device, and control of rate of feed, or even the depth of cut by power tubes, which adds a discretionary measure indicates to me that instead of a complete pre-determination of all factors involved, electronics may have the means to modify the rate of cutting at the discretion of the tool, or the work, or the machine, and even in cases to provide two cuts or a better finish, or whateven other factor may be important. If electronics can fly a plane across the ocean, and attend to the various factors indigenous to such performance other than the direction provided by radio, then certainly there are means in this for covering machine tool operations."

New Machines Different From Prewar Prototypes

Tell Berna, general manager, National Machine Tool Builders' Association, Cleveland: "Never have machine tool builders had more to sell to the customer in terms of concrete realizable results than is the case today. But coupled with increased performance are postwar prices, higher not merely because of increased costs but because in many cases a new machine is far different from its prewar prototype. It is like comparing the price of a modern



Ford to that of a 'Model T.'

How can we justify present prices? Let's suppose that a new machine actually costs twice as much as the old one used to. Here is a breakdown of hourly cost of operating a general-purpose machine of a particular type, secured from a user, these being 'per-hour' figures:

Labor	$1.60
Material	1.95
Floor space	.022
Service Departments	1.354
Departmental Operating Expense	.615
Depreciation on other equipment such as cranes, etc.	.459
Depreciation on the machine itself	.10

"Add these all together and you get $6.10. Out of that total only the 10c representing depreciation of the machine itself has any relationship to the original machine cost.

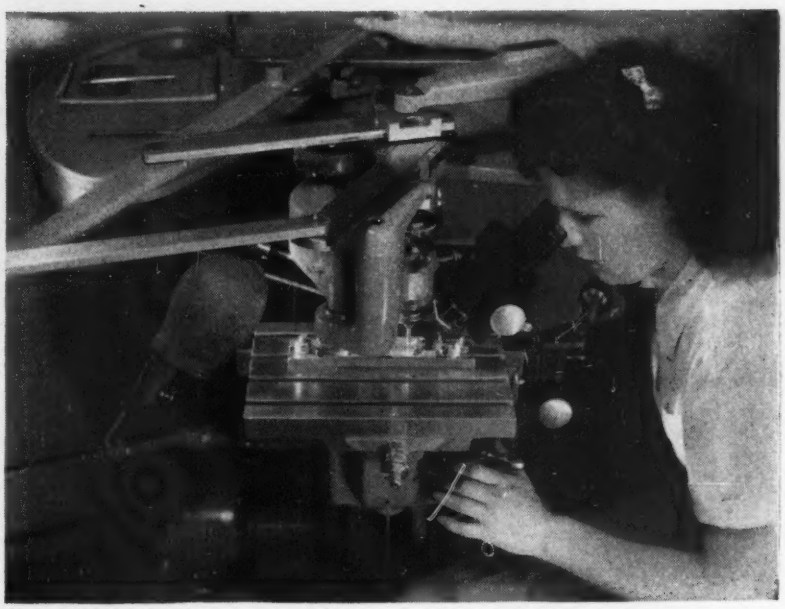
"Now if you replace that machine with a new, highly productive model that costs twice as much, that hourly depreciation charge is doubled—in short, it is increased from 10c to 20c. But the net increase is only 10c—and in relationship to the total operating cost, this represents an increase of only 1.6 per cent.

"Who wouldn't pay 1.6 per cent more in operating costs, to increase operating output by 10, 20, or even 30 per cent?"

Trend to Single-Station Units Served by Automatic Loading

W. S. Praeg, president, National Broach & Machine Co., Detroit: "One of the most important problems in the field today concerns the handling of work to and from the machine. As one prominent production manager pointed out, there are too many instances today where more time is consumed in handling the work than in machining it. In other words, the machine under such conditions is actually waiting on the operator. This situation is being corrected by making the handling of work parts automatic and also in organization of the flow of materials through the various production operations.

"Another noticeable trend is that



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she MAKES it better

This operator *knows* that her work will pass inspection. With the aid of a Spencer *Stereoscopic* Shop Microscope she sees smaller details and controls her operation more accurately. The result is less scrap; lowered costs; increased profits.

Designed to meet critical wartime requirements, the Spencer Shop Microscope offers manufacturers new possibilities for quality control at every point—inspection of raw materials, toolmaking, tool inspection during operation, fine machining, and final inspection. Equipped with or without standard base, it is adaptable and can be permanently mounted to your equipment. Choice of optics offers magnifications from 9X to 54X.

For further information write Dept. X137.

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Better correction of transmission "enemies":

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1/6 to 40 H.P.
Pat. and Pats. Pend.

. . . CORRECT ALL 6

Because Lovejoy L-R coupling cushion material can be selected for practically every job, they're sometimes called the "tailor-made" couplings. Select *any* from 1/6 to 2500 H. P. and you'll find them equally efficient at the job they're intended.

Lovejoy Couplings need no lubrication—ever. No metal to metal contact, means less wear and a more quiet coupling. Send for Selector Charts and Catalog showing prices, bores, etc.

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Cut Coil Costs

LITTELL Reels, Cradles, Winders, Feeders —are unexcelled in handling coil stock. They save time. One coil, hundreds of feet long, feeding steadily instead of dozens of short strips. They save material. A continuous ribbon. Economical dovetailing of blanks thruout entire length of coil.

Easy-running, ball-bearing, self-centering, adjustable stock supports—are among the features of Littell Reels. Plain or motor-driven Reels. Coil capacities up to 6,000 lbs. Cradles for coils up to 20,000 lbs. x 72" wide.

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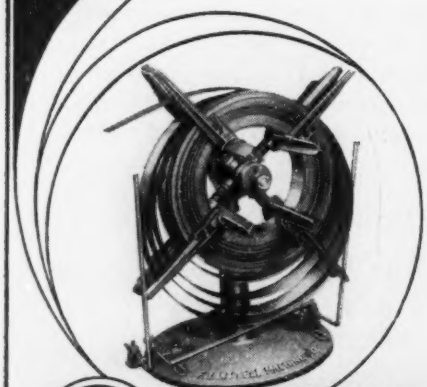

SPEED WITH SAFETY

F. J. LITTELL MACHINE CO.
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away from multiple station machines. Such units are satisfactory only as long as no trouble develops, but when one station becomes inoperative, the whole machine must be shut down with a substantial loss in production time. Instead of this, production managers favor batteries of single station machines, preferably equipped with automatic loading. Such batteries served by one or more operators are not put out of commission when one unit develops trouble.

"Chip disposal is another problem that has become important in many plants. Conventional methods now are too slow and too costly where modern high speed machines are in use. Again, the remedy has been found in automatic chip handling with automatic reclamation of coolants. This prevents congestion in the shop, loss of coolant, loss of scrap and the hazard of oil soaked shop floors. The most successful machines of the future will probably be those which have most completely reduced the hazard of error in human judgment and the necessity for arduous physical effort in their operation."

"Customer Education" Important In Proper Use of Carbides

K. R. Beardslee, vice president, Carboloy Company, Inc., Detroit: "Extent to which the use of cemented carbides—not only for cutting tools, but also for dies, punches, wear parts, etc. — will increase during the coming year depends to a large extent on the effectiveness with which the carbide industry can convey its knowledge to potential and actual users. We have entered a new era in the utilization of carbides. In the years preceding the war we were still introducing carbides. Almost every job was new and had to be proved through the personal study and time of the field engineers and servicemen of the major carbide companies. Inevitably, costs of carbide tools were high, growth was sure but slow. Today it is no longer economically feasible to provide individual assistance on each job to almost every manufacturer. Many carbide tools today sell for no more — frequently for less than —

equivalent steel tools.

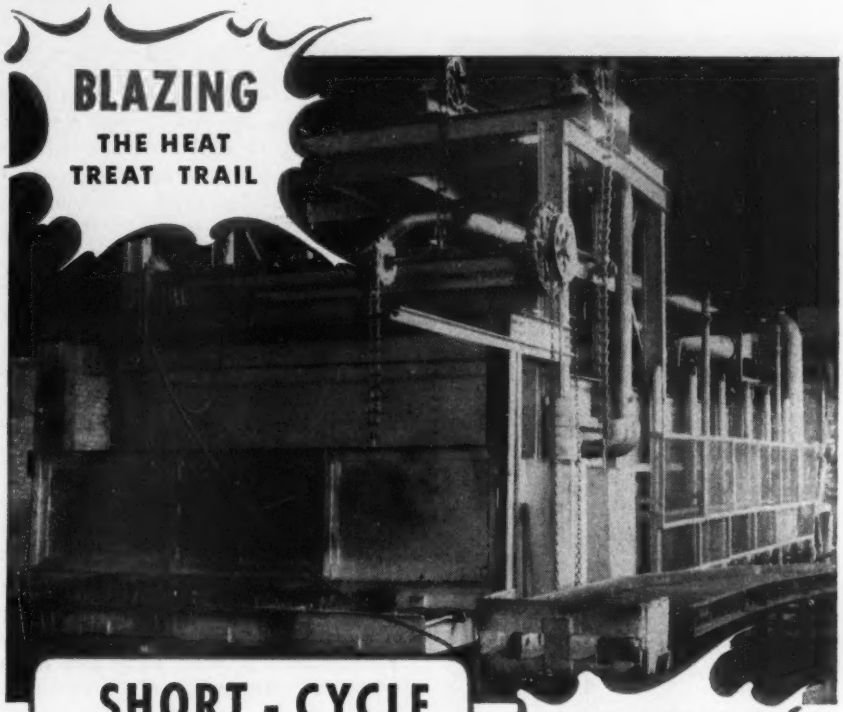
"To broaden the effective utilization of carbides our problem today is to teach industry how to meet its own day to day problems through the possession of a better understanding of where and how to use carbides. Regardless of the tremendous educational work already done along this line, the job is still a big one. New knowledge gained from war experience, changes in industrial personnel, expansion of industrial plants—are all factors.

"The importance of customer education, it should be understood, is not confined to their use of carbides in the form of cutting tools. It applies equally to our new and vast fields of metal forming, drawing and stamping, to the mining field, and to those countless manufacturers who can—if they possess the know-how—improve their products through the efficient utilization of carbides."

Tool Engineer Seen As Industrial Statesman

Harry E. Conrad, executive secretary, American Society of Tool Engineers, Detroit: "Everyone realizes industry has done singularly outstanding jobs in fields of production, distribution, scientific research and development, and in other mechanical endeavors which have made America the most highly productive social unit yet devised by human ingenuity. We are waking up to the fact that all of these advancements deal with highly tangible, concrete things. We have not yet begun to scratch the surface of such abstract and intangible things as human relations and human engineering. Within these fields lie the keys to future industrial and human progress. Within them also lie both our greatest opportunity and our greatest responsibility. If we are to continue in a free society we must hasten the development of human beings in the industrial organization.

"Some managements have been prone to think of their employees as machines or statistics. On the other hand, too many workers think of their employer as a strange octopus



SHORT-CYCLE MALLEABLE ANNEALING FURNACE

Another example of Holcroft "trail blazing"—the first radiant tube continuous furnace for short-cycle malleable annealing, installed more than 10 years ago and still producing economically.

DEVELOPED BY *Holcroft* IN 1936

Short-cycle malleable annealing is a fast, economical process which offers the following advantages to large-volume manufacture:

- The process requires as little as *14 hours,* as compared to *several days* for other methods. This means reduced inventories and faster shipments.
- It produces *clean, scale-free work* which can go directly to shop or assembly without further processing.
- It permits the use of *light-walled containers* — reduces dead weight by as much as 400%, and cuts fuel bills correspondingly.
- It enables large and small castings to be handled simultaneously.
- Compared to other methods, it gives several times the production per unit of floor area.

Although continuous furnaces are most frequently used, this process is also successfully applied to batch-type furnaces. As with all Holcroft furnaces, each installation is *designed individually* for the specific application, thus meeting every requirement of production and quality with maximum over-all economy.

In ordering production heat treat furnaces for ANY need, it will pay you to take advantage of Holcroft engineering leadership. And remember—Holcroft offers you *complete metallurgical and engineering service,* from individual furnace design through the trial run in your plant.

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5724 Navigation Blvd.

Canada: Walker Metal Products, Ltd., Walkerville, Ontario

Actually, both managements and workers are one and the same breed. Both are very real types of individuals, and underneath all of the violent words and smoke screens thrown out by both groups are found the same common aims and objectives—the same fundamental brand of Americanism that led us into this highly productive economy.

"Primarily, managements want from their workers the productivity necessary to continue to compete in world markets while keeping pace with high wage rates. Unless per-man-hour productivity shows a constant increase, we will not hold our lead in international trade. If productivity declines, our domestic society cannot long maintain its present standard of living. Our workers simply must produce more and more per man-hour to reap expected gains.

"Employees wants from management are basic and, on the whole, entirely reasonable. Security, opportunity and recognition top the list in any scientific poll of workers. These go far deeper and are much more far reaching than wage demands. It is squarely up to progressive managements to provide these incentives, these basic essentials, if we are to return to an orderly continuity of society and reasonable and logical standards of human behavior.

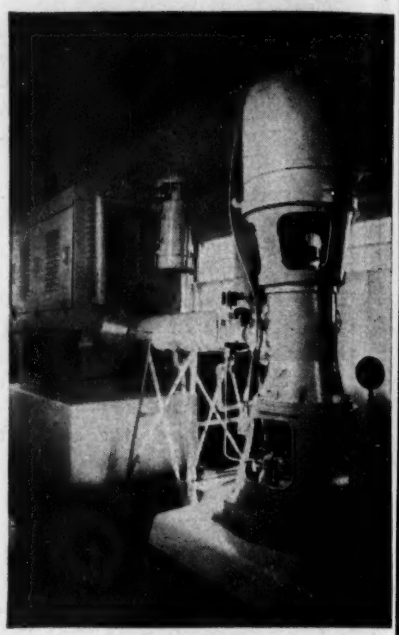
"Some neutral force in the middle of these divergent factors should be utilized to bring their views, or the men involved, face to face to settle their differences. The American Society of Tool Engineers feels that it occupies this middle ground and is nonpartisan. It is attempting to inform its members in the fields of human relations and human engineering so that these men can serve in interpreting management to labor, and labor to management.

"It is elementary that this program must be built on a firm foundation. Sources of complete and unbiased information should be made available from the innermost core of management. Our leaders must realize that what management 'is and does' is far more important than what it says about itself.

"Industry must realize that it cannot deal with its problems in human relations by directing its efforts toward the mass. It must get down to the individual.

"Tool engineers are in position to render a vital service to industry in this field. Because tool engineers meet both the workers and their management face to face every day. This

IN CASE OF
Power FAILURE



The city of Margate, New Jersey no longer worries about an unforeseen powerline failure. Their newly installed million gallon per day Layne Well Water System is DUAL POWERED. Should the power fail and the electric motor "go dead" a big husky gasoline engine takes over to keep up water production.

Margate's new dual powered water system is a quality installation throughout with the very latest Layne developed control and engineering features. And like two other Layne installations for Margate—one of which is over 23 years old, this new unit will also give years and years of satisfactory operation.

Layne Well Water Systems whether installed for cities, factories, railroads, irrigation projects or other use, keep water production at the very lowest cost. Furthermore Layne associated companies constantly provide prompt repair and parts service for their Layne installation. For late catalogs, address Layne & Bowler, Inc., General Offices, Memphis 8, Tennessee.

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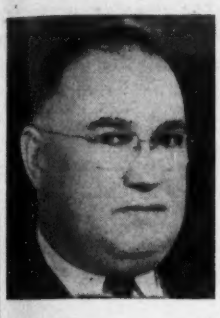
AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. ★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn. ★ Layne-Northern Co., Mishawaka, Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne-Northwest Co., Milwaukee, Wis. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Pacific, Inc., Seattle, Wash. ★ Layne-Texas Co., Houston, Texas ★ Layne-Western Co., Kansas City, Mo. ★ Layne-Minnesota Co., Minneapolis, Minn. ★ International Water Supply Ltd., London, Ont., Can. ★ Layne-Hispano Americana, S. A., Mexico, D. F.

assignment requires real industrial statesmanship . . . but America's tool engineers stand ready to meet this challenge."

Careful Analysis Required In Selecting Presses



George Habicht, Jr., president, Marshall & Huschart Machinery Co., Chicago: "The art of stamping is one of the oldest in the metal forming field, but until recently the practice in most factories was to 'contract out' such work to shops that sepecialized in it. However, modern needs for keeping close hold on controls now have changed the picture.

"As a consequence the stamping department has become an integral and important part of many metal trades plants and stamping has really come into its own.

"Problem of press selection is somewhat different from that of 'metal cutting' machine tools. There is too much tendency to feel that most any press is good enough. Such an attitude is fostered by the idea that the dies are costly and should take care of the problem if they merely are supplied with something to actuate them.

"This is fallacious. The same detailed analysis should go into the selection of a press as into the selection of machine tools. That is of primary importance because dies and other perishable tools for the press—representing as they do such a large proportion of the total cost of the setup—deserve the best treatment.

"For instance, in many cases one set of dies for an open back inclinable press represents a larger investment than the best press obtainable, so that care in the selection of the press will be reflected in increased die life and economy of operation.

"Many high operating speeds are less important because other considerations such as handling the blank sheet and its removal from the dies after stamping in many cases are greater factors in production costs than the actual number of strokes per minute that the press is capable of making. Design of the frame, including its rigidity and ability to ab-

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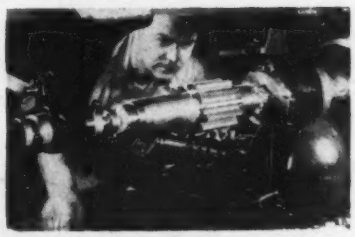

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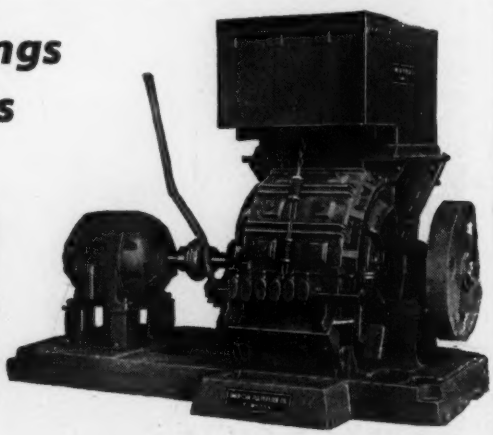

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sorb the stresses set up in forming and stamping, should be carefully considered.

"A further point that is in danger of being overlooked is the method of translating rotary motion of motor into linear motion of slide. This design should reduce to an absolute minimum the chances of tilting or cocking of the slide. Even today with the prevailing use of die sets, attention should be paid to the method of keeping the slide and platen aligned.

"Press manufacturers must recognize this need for greater accuracy of alignment between slide and platen under full pressure at the bottom of the stroke. They not only should redesign their presses to give this greater rigidity and accuracy but also should completely overhaul their own shop methods to work to the closer limits of accuracy so essential if their presses are to take their proper place in the modern production picture.

"It is useless to use costly multiple and progressive dies in an attempt to produce more products at lower cost if they are not 'backed up' to the limit with presses that conform to modern requirements.

"Clearing Machine Corp. recognizes the following trends: First, that improvement in quality of raw material permits production of more complicated parts; second, that dies on which such parts are drawn or formed are both intricate and expensive; and third, that rising labor costs demand presses designed to keep rejects to a minimum and die life at a maximum. These factors have inspired their entirely new design of open back inclinable press."

Better Equipment, Sales Methods Twin Keys to Inflation Problem

Frederick S. Blackall Jr., president and treasurer, Taft-Peirce Mfg. Co., Woonsocket, R. I.: "The precipitous increase in the price index of all manner of goods which has taken place during recent months is a matter of direct concern to every business organization. If this trend is not halted it can generate at the least a boom and bust, or at worst a flight from the dollar. Either would be dis-

astrous to our economy.

"Industry has been criticized in some quarters for the present situation because so much was said, prior to lifting of government controls, to the effect that all that was needed to maintain prices at reasonable levels was to open the floodgates of production. This solution was voiced by government quite as freely as by industry. Its fallacy reposed in the fact that production provides only a part—even though an important part—of the solution. So long as demand continues to increase more rapidly than production and—equally important—so long as both demand and production together stand in an inadequate ratio to the supply of money and credit, prices inevitably will rise.

"Many economists question whether it will be possible, even if our nation's productive facilities were to operate at full capacity, to avoid a further spiral of prices without a major contraction in the volume of money in circulation, to be effected through a sharp reduction in the national debt, or, per contra, without an increase in total national production coupled with an ultimate increase in the normal demand for goods and services.

"These complexities lead too many people erroneously to assume that the problem is one which must be dealt with—if at all—at 'government level'. They forget that national production is but the integration of the output of each one of us, that national demand is the sum total on the order boards of all producers. Thus it follows that things which we do or fail to do as individuals, in the long run will shape our nation's economic destiny.

"The immediate task before us, so long as demand continues to outrun supply, is to increase our productivity by every possible means. The ultimate task is to step up demand to the end that national demand as well as national production shall stand in reasonable ratio to the volume of money in circulation.

"These considerations all point to the need of enlightened industrial policies in replacement and renewal of mechanical equipment. Also of exercise of unremitting effort—especially as markets become governed by a sellers' rather than a buyers' psychology —in perfecting our sales techniques.

"Every manufacturer must recognize that his annual equipment depreciation allowances, as reported on his federal tax returns, comprise a revolving fund of purchase money, the purpose of which is defeated if it is not spent consistently and without de-

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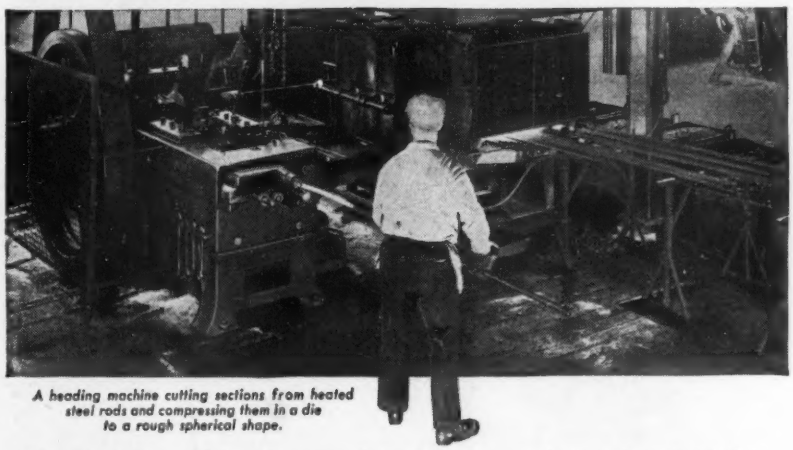

A heading machine cutting sections from heated steel rods and compressing them in a die to a rough spherical shape.

The steel is carefully chosen and inspected, even before it gets to the heading machine. After being "born" here, balls are carefully "brought up," through a long series of grinding and lapping operations, to the unbelievably high standards of finish, sphericity and precision which have made Strom Metal Balls the standard of Industry. Strom Steel Ball Co., 1850 South 54th Avenue, Cicero 50, Illinois.

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viation, according to a prearranged policy and schedule, in the replacement of outworn and obsolete machinery and tools.

"I attach such importance to the application of depreciation allowances to a progressive equipment program that I should not hesitate to accord it No. 1 position among factors which have enabled our own company to remain competitive, to prosper and to maintain its high standards of precision and production during the past two and a half decades. For over 25 years, Taft-Peirce Manufacturing Co. has followed an unerring policy of spending its equipment depreciation allowances on new machinery, *annually and without notable exception,* plus, in normal years or better, a substantial additional appropriation from net earnings.

"In an era of rising price trends, such as we have experienced for some 30 years, the latter becomes quite as important as the former.

"Only during a long period of stable or falling prices will the return of capital, represented by accrued total depreciation on an asset, prove adequate to replace the asset and thus maintain its productivity. Manufacturers of mechanical equipment should be especially diligent in overhauling their replacement and renewal policies, not only for internal welfare of their plants but also because of the example they thus can set to their clients. The shoemaker's children have no right to go unshod!"

Tool Engineer Must Guide Progress of Productivity

Otto W. Winter, president, Acme Pattern & Machine Co. Inc., Buffalo: "We are witnessing an accelerated evolution of the science of mass manufacturing called 'Tool Engineering.' The war provided vast opportunities and impetus to this field of engineering. Tool engineers, those men with know-how and ingenuity and with the assigned job of putting goods into production, made it possible to win the war. Leaders of the armed services admit that. Now the tool engineers have it in their power to win the peace. We hear daily of rising costs, prices and wages. We hear too little of rising production. We hear pleas for increase of worker efficiency. Outside of a worker turning in an honest effort toward an honest days work what else does this last thing mean? It could mean production of more with less time and effort. That is, as all sound thinking and reasoning must conclude, the only real basis of material progress and prosperity.

"This is true the world over as well as in the United States, as is amply testified by the awesome respect of other nations for American production techniques and ability. The fact that the initial measures in our recovery plan for Europe involve the furnishing of production equipment 'American style', speaks for itself.

"Things learned in war production with its urgent mass demand and extensive use of inexperienced personnel, point the way toward tooling for peace. Reduction of manufacturing costs in the face of high material prices and wages, presents a wonderful opportunity for intelligent tool engineering. Today production is para-

★ *Translation—"Top Quality"*

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Take, for example, the name, "AVONDALE". To our customers, all over these United States—"AVONDALE" means—what? It means the best in STEEL "Shipbuilding" and tops in "Engineering" "Know-How" and "Carry-Through".
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mount, labor is scarce but above all competition is back and makes it imperative that costs be held down.

"As a result we are witnessing a renaissance of the special machine. Smart tooling in the form of clever jigs, fixtures, etc. is not enough. Increased cutting speeds and feeds have their limitations. Progress has always been based on increased effectiveness of the individual worker and reduction of manual effort and drudgery. Our progress continues along that familiar road. Why should a job be performed on several machines in several separate operations, with unavoidable intermediate handling, when one machine can handle it at one setting, by one operator, at one spot?

"Combined equipment capable of integrated machining, welding, forming and assembling is only limited by the tool engineer's ingenuity and practical economics of the application. Opportunities are not limited to production functions but include loading and ejection of the work. Modern electronic, electrical, hydraulic, and pneumatic controls and power units have much to do with the special machine's current success.

"If we do not lighten the load on the worker while increasing his effectiveness, we are not making true progress in tool engineering. Aside from the humanitarian aspect, reduction of fatigue and drudgery has always proved to be good business. Don't sweat the man, sweat the machine.

"Let's also look to the tool engineer who in some capacity or other will shape this renaissance, this industrial evolution, this peace winning progress of productivity. The tool engineer at long last has became a man of achieved importance and respect in his sphere, in his community and throughout the world. Awakening within him of a professional spirit will increase the caliber of his accomplishments."

Lowering of Operating Costs To Require Bold "Top" Decisions

K. W. Connor, president, Micromatic Hone Co., Detroit: "The future holds forth a definite possibility for manufacturing industry to get on top of the inevitable higher labor rates and deliver better quality products at lower prices—but it is a major operation. It's going to take some bold decisions by top management. This is not going to be accomplished by just patching up a few weak spots.

"The whole manufacturing sequence should be restudied, from the stand-

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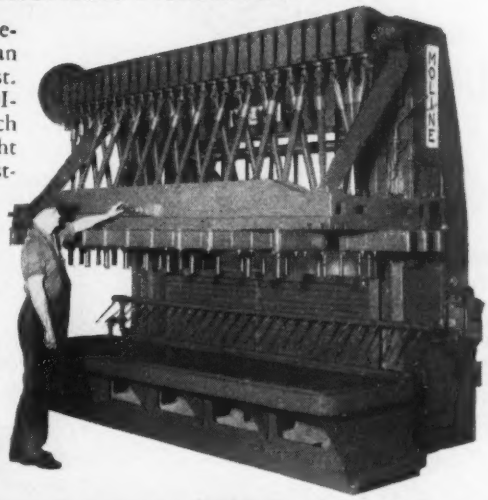

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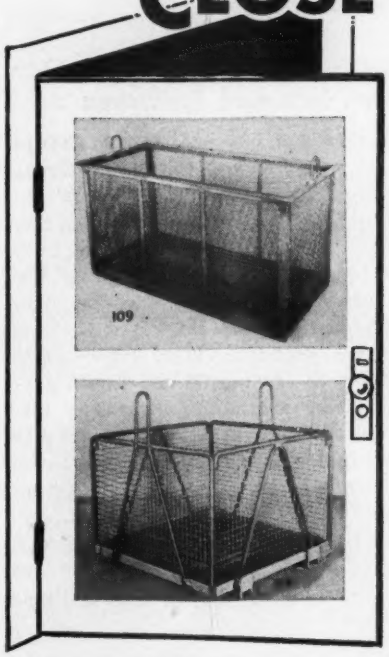


Reduce replacement costs with Stanwood long life baskets. Made of special metal alloys that resist heat and corrosion, they give maximum service life in handling parts through conveyor and pit type furnaces.

Get further savings from easy handling afforded by Stanwood designs, which provide ample strength with minimum weight.

Baskets and crates are furnished in a wide variety of designs. Basket in upper picture is heavy duty type for handling parts through degreasing. Lower picture shows large alloy basket for pusher type conveyor furnace.

Send for new catalog 16 which describes Stanwood baskets, trays, fixtures, retorts and carburizing boxes.

Stanwood Corporation
4825 Cortland St. Chicago 39, Ill.
FABRICATED METAL PRODUCTS

point of taking full advantage of the new accomplishments offered at the Machine Tool show.

"Government should allow a faster depreciation rate, and management will have to think in terms of larger capital investment in plant and equipment, so that operating costs can come down through the use of better tools and less human effort than heretofore.

"Under present conditions, no longer can the master mechanic, or the chief tool engineer be expected to conceive the entire plan for complete plant rehabilitation. Top management will have to visualize overall possibilities from what they saw at the show, and give their under organizations definite instructions, backed up with proper appropriations, in order to accomplish the job ahead and stabilize our economy under the well-established profit system.

"Succinctly, it is believed that the most successful mechanical goods industries, of the future, shall be those which avail themselves of the economic advantages of the latest machine tools. Compromises or minor improvements to accomplish this objective will not be sufficient to insure them against economic impotency upon the return of a definite 'buyers market.'"

Improved Machine Tool Design Offers Increased Production

J. K. Fulks, vice president in charge of manufacturing, Ex-Cell-O Corp., Detroit: "Machine tool builders' exhibits at the show in Chicago conclusively demonstrated that they have all improved their products by improving their designs. The demonstrations made there proved that increased production and lower costs could be guaranteed the purchaser of machine tools. The machine tool built a few years ago was principally a mechanical unit; the present-day machine tool is a combination of electric, electronic, hydraulic, and mechanical devices. Present-day machine tools are far superior in every way to the tools built a few years ago.

"Much has been done by the individual machine tool builder to improve the appearance, at the same time making the tool readily accessible for adjustment and maintenance. Two specific examples of this trend are the manifolding of hydraulic lines, and the use of electric terminal or junction boxes, both of which fa-

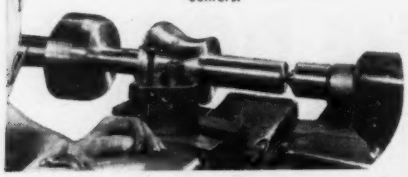
These Men Will Tell You

IDEAL

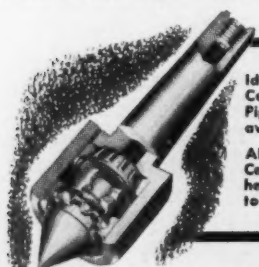
LIVE CENTERS CUT COSTS!

Says JOSEPH DIETZ
General foreman of Republic Flow Meters Co., Chicago: "Ideal Live Centers give us greater turning speed and have helped increase production 15% to 25%. They save both grinding time and lubricating time."

Says FRED HUER
Machinist at Republic plant: "Ideal Live Centers improve the quality of the work. They eliminate chatter, center lubrication, and burned out centers."



In scores of plants the story is the same: Ideal Live Centers mean better work at lower cost. No friction between the center and the work—no burning or gouging—deeper cuts and faster turning speeds. Ask for information and free demonstration.



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the AMERICAN CRAYON company
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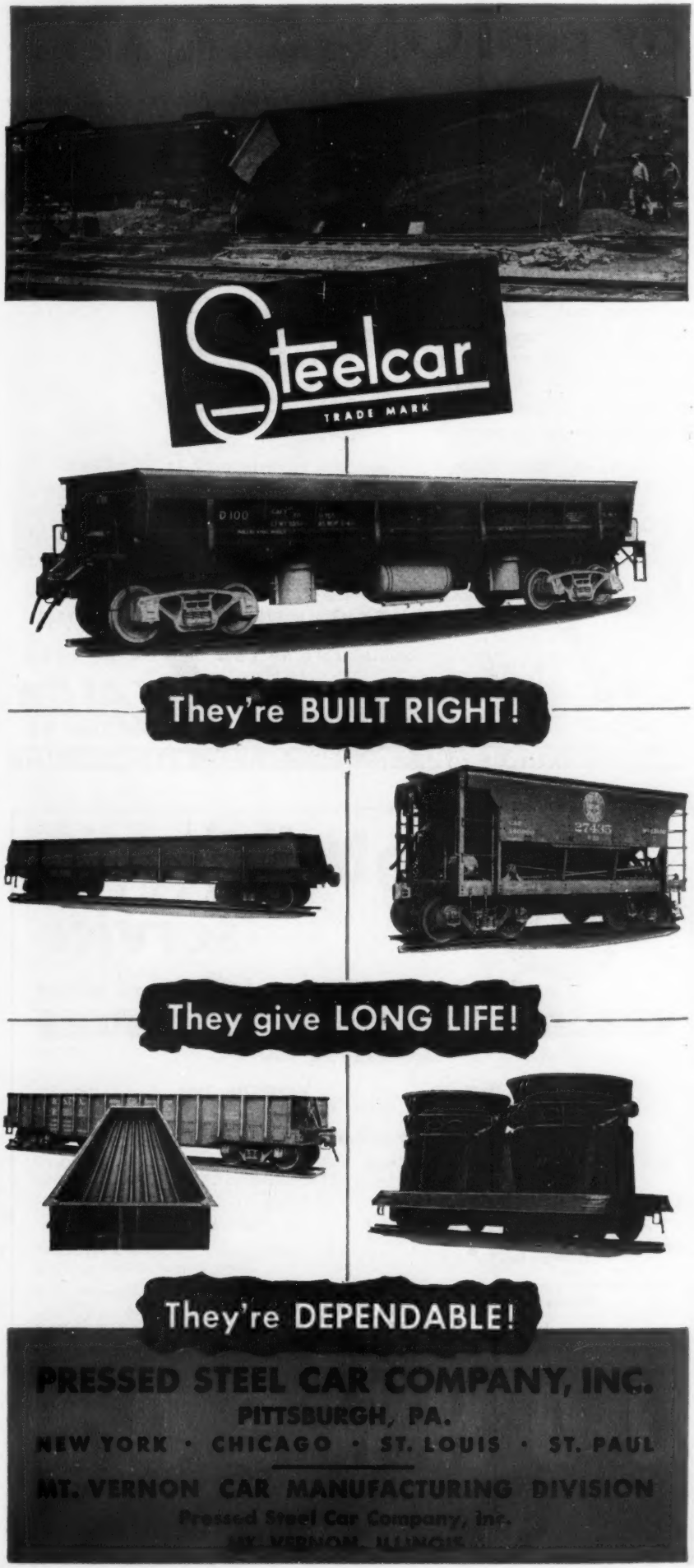
cilitate the service and maintenance of machines.

"Considerable progress has been made in standardization, especially of tool-holding or supporting mechanisms where they are a part of the machine tool, also in the wiring of electric motors and controls."

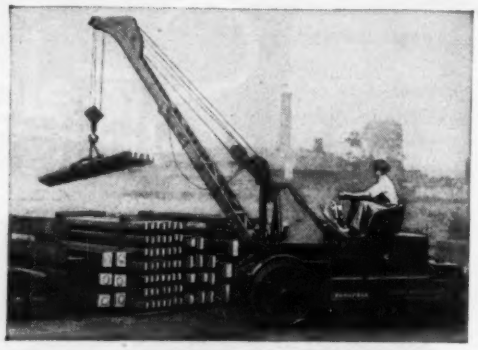
Machine Tool Industry Is Not Designing Self Out of Business

B. N. Brockman, vice president, R. K. LeBlond Machine Tool Co., Cincinnati: "We wonder what justification there is for all the new gadgetry which was so prevalent on many of the lathes displayed at the 1947 show. Can the average user of engine lathes really condone paying the relatively high cost of electronic controls, automatic cycles, variable voltage drives, and the myriad other so-called refinements. True, in many instances they are nice talking points, but, in the writer's mind, wonder what the outcome of this trend is going to be once production assumes a more normal trend. For example, many people who called in our booth would ask, 'show us a standard lathe', and with one or two exceptions, this was the type of machine which we displayed. But the point is that many visitors felt that the machine tool industry is designing itself out of business. Please understand this applies only to the conventional or standard engine lathe and not to equipment as would be used in automotive manufacture on cylinder blocks, connecting rods, crankshafts and other parts. In our own case, we feel that our designs and advancements are in many instances ahead of the times and our further feeling is that while we are prepared to offer variable voltage drives, electronic controls, hydraulically operated machines, and contouring devices, we will still produce to a large extent machines which are simple in operation, easy in maintenance, and, less costly in initial investment. In ninety per cent of the jobs, lathe work is held between centers or in a chuck and so long as a single tool is employed in stock removal, it appears to us that a standard lathe with speeds and feeds in proportion to the size of the machine with a minimum of control points,



8¢ per TON is Cost of Handling Steel Reported by This Plant

KRANE KAR is used by Kropp Forge, Chicago in the outdoors material storage yard for unloading and storage work and for moving bars and billets into the plant through low shop doors. Single billets up to about 15,000 pounds each are easily handled . . . Up to a quarter million pounds of steel are moved in an eight-hour day with ***KRANE KAR*** at an average eight-hour fuel consumption cost of about $1.50 . . . Extreme maneuverability is valuable for getting in and out between closely piled stacks of steel bars and billets. As a portion of the yard does not have a cement floor, the pneumatic tires provide ideal traction. This unit finds additional use in unloading and handling heavy forging hammer repair parts, loaded tote boxes, and other miscellaneous heavy materials handling work. — *Transcribed from a letter from Kropp Forge.*



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2½, 5, AND 10 TON CAPACITIES

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still has the major sale and production possibilities.

"Basically, as you know, we are engine lathe builders and the foregoing thoughts apply only to machines of this type of construction. By no means are we attempting to discredit any advance in lathe improvements for you know we have pioneered many of them ourselves but do think we are reaching a point wherein we can not conscientiously offer many of these advancements on the basis of cost-cutting as by necessity your initial outlay will be high and maintenance a decisive factor.

"Right now there seems to be a prodigious demand for contour turning. It is our own feeling that many of the units on the market today are entirely too elaborate and, therefore, necessarily high in cost. There is much complication involved in the average contouring device. It has always been our thought that these could be simplified and we have accomplished just that in our electric contouring unit."

Tracer-Controlled Cutting Tool Aids Template Work Duplication

Alfred Kullman, vice president and works manager, American Tool Works Co., Cincinnati: "Especially prominent at the Machine Tool Show in Chicago, was the tendency of the new designs to minimize manual effort in operation, to increase accuracy of work duplication by mechanical means, thus relieving the operator of much of this responsibility, toward improving chip control and disposal and to adequately proportion and power for the effective use of cemented carbide cutting tools. Perhaps the most interesting new machining technique revealed was that of work duplication of a template by a tracer controlled cutting tool. Amazing strides have been made in this new process in the art of metal cutting and it appears that a wide and fertile field awaits its introduction.

"Basically this process is designed to reproduce circular shafts from a flat or round template by means of a tracer controlled cutting tool. Work such as spindles, motor shafts, valve stems, piston rods, railroad locomotive

and car axles, in fact, any round shaft regardless of length, number and depth of shoulders, tapers, recesses, undercuts, grinding necks and radii may be reproduced faithfully and accurately with amazing rapidity—all generated by a standard turning tool.

"Machining time is often reduced to that usually associated with automatic lathes which employ multiple tooling. With automatics, an operator may run two machines, thereby halving the piece labor cost. However, on job lot production the setup time required on the duplicating lathe is usually less than 10 per cent of that required for the automatics—so the resultant lot cost may be even less when the work is done on the duplicating lathe.

"In addition to a lower investment in machines, the duplicating lathe requires a very low cutting tool inventory and reduces tool maintenance to sharpening of standard turning tools."

Sees Automatic Equipment Opening New Industrial Era

E. E. Butler, vice president, Vinco Corp., Detroit: "High speed machining of parts will do much to lower production costs in the future. Automatic and semi-automatic turning machines, capable of doing a job in minutes instead of hours will help open a new industrial vista. Improved methods of controlling and refrigerating coolants and semiautomatic work holding methods must be developed in order to get the most from these high speed machines. Air or hydraulically operated chucks of improved design and more accurate operation are, it seems, the answer to the work-holding problem. Gaging by hand is vanishing from the industrial picture because it is too slow. Methods of automatically gaging work, while in process, are becoming more and more prevalent. This development is still in its infancy but its potentials are tremendous. Automatic gaging, controlled electronically, may well be one of the largest single factors, except for atomic power, in changing the industrial picture. The element of human error will be eliminated and tolerances in millionths of an inch, if necessary, will be held."

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MICROHONING is
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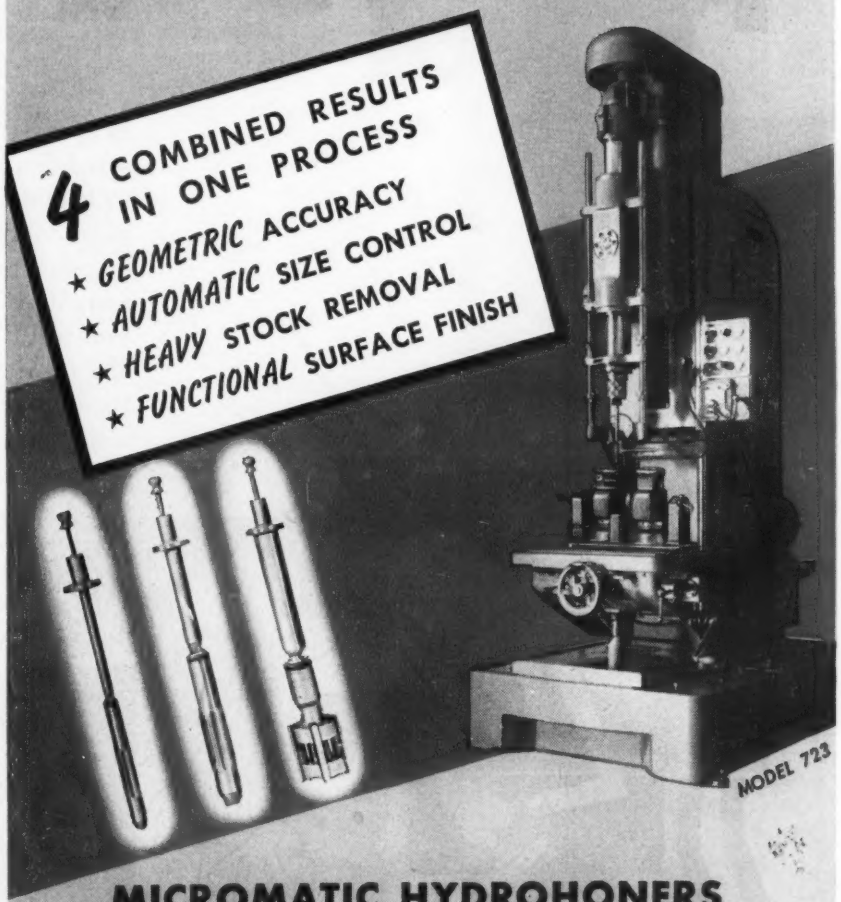

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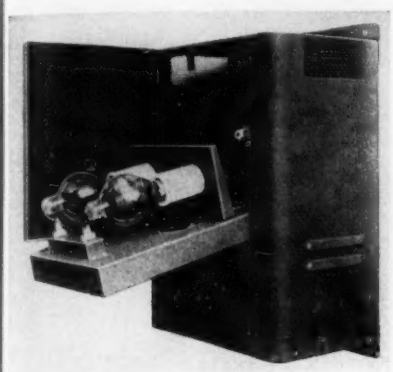
UNITED STATES STEEL

Electronic Rectifier

Suitable for small direct current motors, magnetic chucks or applications where direct current is required, a new electronic rectifier, made by Weltronic Co., 19508 West Eight Mile Rd., Detroit 19, Mich., features better ventilation and easy accessibility to parts.

Rectifier voltage is 115/230 direct current, 115/230/460 alternating cur-



rent. Its control panel tilts forward for servicing. Mounted on front panel are main line switch, line fuses and time delay relay which prevents operation of power tubes until filaments are properly heated. On back of control panel are mounted the two power tubes and terminal strip where all connections are made. Red light on door shows when unit is energized.

Milling Machine

Designed for rapid, economical production of small parts required in the manufacture of many machines, the No. 000-4 unit type milling machine, built by Cincinnati Milling Machine Co., Cincinnati 9, O., is

composed of four individual milling machines of small sizes mounted together on a single base. Four separate operations may be performed progressively by the different units. Machines are completely hydraulic, having piston and cylinder table feed and axial type hydraulic motors for spindle drive.

Table travel is 4 inches and vertical adjustment of spindle carrier is 3 inches, ranging from 2 to 5 inches between top of table and centerline of spindle. Spindle is ball bearing mounted in a quill which provides ½-inch cross adjustment. Speed ranges are from 1 to 40 inches per minute for table feed and from 500 to 1800 revolutions per minute for spindle speeds. Feed and speed rates are selected independently for each machine. Table operating cycles are completely automatic.

Lathe Air Tracer

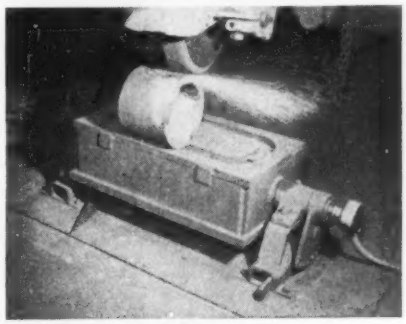
Two hydraulic cylinders, one to control the cross feed of the cutting tool and one to control its longitudinal movement, are employed by the type A Air-Tracer, a develop-

ment of Monarch Machine Tool Co., Sidney, O., for bringing high production manufacturing economies to small lot operations on its precision, engine and toolmaker's lathes. Because the motion of the cutting tool is stepless, a smooth continuous finish is imparted to the work. Only one cutting tool is used.

Either a master template or a master work piece may be used. They are supported by a rail to the rear of the carriage, making quick setup from the front of the machine possible. Tracer is responsive to slight changes in template shape. Starting, speeding up and slowing down of either or both of the feeds is entirely automatic. Both cross and longitudinal feed rates are ¼ to 15 inches per minute, with movement of 40 inches per minute also available. Illustration shows air tracer mounted on a Monarch 10-inch precision lathe.

Positioning Magnet

Heavy castings may be held in position under a swing grinder with the Hold-Tite electromagnet, developed by Dings Magnetic Separator Co., Milwaukee, Wis. Unit will hold castings of any shape securely, elim-

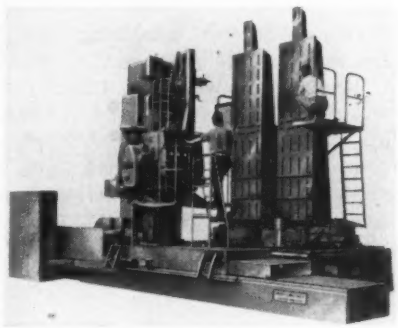


inating blocking, wedging and clamping. Overall grinding time is reduced as a result of its use.

Wearing plate on which the castings are placed is renewable. Magnet is available mounted on a tilting trunnion with seven positions controlled by a foot lever, or can be supplied as a base magnet. Two sizes with magnet face 16 x 29½ inches and 16 x 16 inches are offered, with current consumption of 600 and 400 watts, respectively. Direct current of 115 or 230 volts is required.

Milling Machine

Announced by Pratt & Whitney Division of Niles-Bement-Pond Co., West Hartford 1, Conn., is the type BG-22 Keller tracer controlled mill-



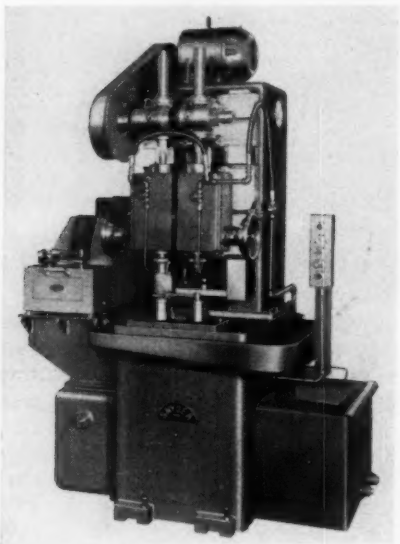
ing machine. It can produce accurately, from three-dimensional models, the large dies needed for automobile bodies. Machine is controlled by a sensitive tracer and operated by simple electrical circuits which permit

continuous automatic speed variations.

Controls of machine are in one operating station on the spindle head. Above the main station is another station used when setting the tracer and making setup adjustments. Machine operates from any conventional polyphase 50 or 60 cycle alternating current source of power. Its horizontal travel is 120 inches; vertical travel 60 inches.

Balance-Milling Unit

Parts are weighed on integral scales, depth of cut set according to predetermined weight-depth ratio and milled in an automatic cycle with in-



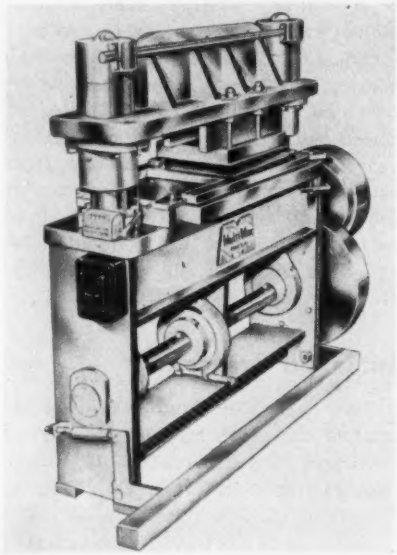
serted blade high speed steel cutters on the special balance-milling machine for automotive connecting rods, developed by Snyder Tool & Engineering Co., 3400 East Lafayette, Detroit 7 ,Mich. Rod is then turned over in the fixture and the cycle repeated. Cycle consists of load, rapid advance, feed, rapid return.

Two 16-second machining cycles are required for each rod, exclusive of loading and weighing. Large cutters rotate at 55 revolutions per minute and small ones at 110, with worm gear and spline shaft drive from a single motor. A 6-inch stroke permits rapid tool changes. One 5 horsepower, 1800 revolutions per minute motor drives the spindle.

Shear and Press

Mechanically operated, the Multi-Max combination shear and press, made by Parker Mfg. Co., 2200 Colorado Ave., Santa Monica, Calif., shears, blanks, notches, punches, perforates, slots, bends and forms sheet metal parts in single or multiple units, with one operator. Of 30-ton capacity, the unit needs no special foundation, has no overhanging parts and requires a floor space of 36 x 75 inches.

Steel plate welded construction is utilized, normalized after welding to



relieve all stresses. Stroke is 2 inches as is ram adjustment. Stroke is down, adjustment up. Bed die space is 12 x 36 inches. A 1½-horsepower, 3-phase motor powers the press,

Selenium Rectifier

Maintenance of constant voltage regardless of the changing amounts of current drawn from it is a characteristic of the selenium rectifier developed by La Marche Mfg. Co., 6525 Olmsted Ave., Chicago 31, Ill. It is constructed to handle large gangs of low voltage direct current magnets in varying loads of from 0 to 20 amperes. Unit has no moving parts.

Rectifier itself is a full-wave bridge type suitable for any alternating current frequency and a line voltage of 115 to 230.

Electric Hoist

Speedway electric hoists, built in capacities of 250 to 2500 pounds by Wright Hoist Division of American Chain & Cable Co. Inc., York, Pa., incorporate a grooved drum which accommodates a full 12 foot lift with no overwinding. Hoists feature push-button control, preformed wire rope with swaged fittings for anchoring, tapered roller bearing trolleys and standard NEMA motor frames and ratings.

Lug, hook or trolley suspension may be furnished as required. Hoists with trolleys are equipped with special pull chain and handle for moving along runway beams, avoiding hazards connected with operator pushing directly on the load.

Shop Microscope

Built to expedite numerous industrial operations where minute details must be closely observed, the new Spencer stereoscopic shop microscope, announced by American Optical Co., Southbridge, Mass., has two eyepieces mounted according to the normal convergence of the eyes for

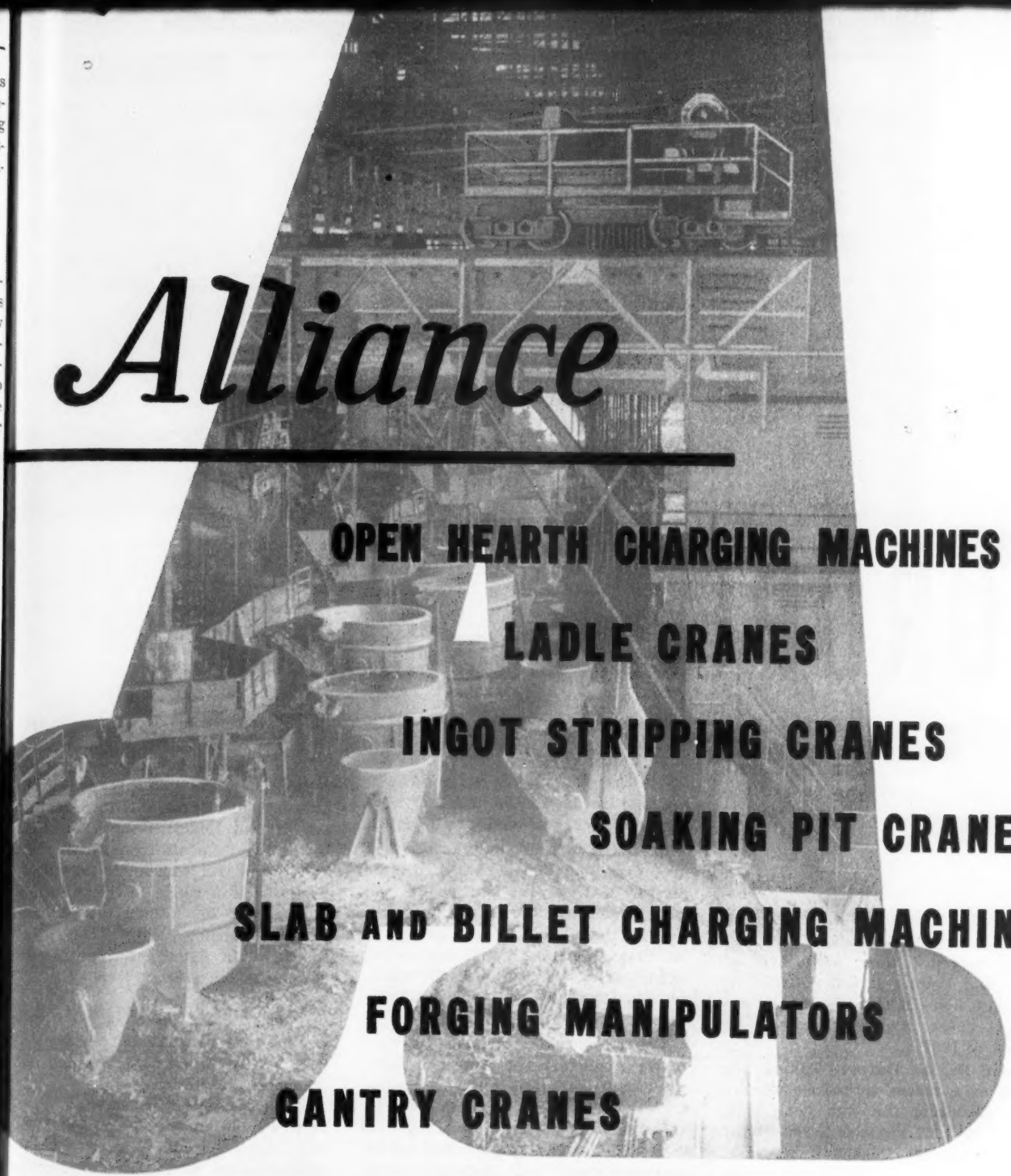
close work. Eyepiece design allows the operator to wear safety goggles with ease.

Instrument is used in observing such operations as injection jet drilling, precision grinding, hand broaching, fine engraving, die sinking, etc. Powers of 9X, 18X and 27X are available.

Locomotive Crane

A diesel locomotive crane capable of traveling at speeds up to 15 miles per hour and performing switching operations is announced by Industrial Brownhoist Corp., Bay City, Mich. It is offered in capacities ranging upwards from 300 tons, depending upon requirements. The diesel-electric combination permits power to be transmitted directly to the axles by inside-hung spring-suspended motors.

Monitor type cab affords operator unrestricted visibility in all directions. An electric swing is available at additional cost. Standard features include air operated controls, antifriction bearings, 14 inch safety clearance between rotating bed and car body and worm-driven boom hoist.



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EUROPE... Drives for Recovery

By VINCENT DELPORT
European Editor, STEEL

STEEL flowed more freely and abundantly from the furnaces of Europe during 1947 than during 1946. Output increased approximately 16.5 per cent, total, exclusive of Soviet Russia, being estimated at 34,725,000 gross tons of steel ingots and castings, compared with 29,780,200 tons in 1946.

Actually, Great Britain, Belgium, Luxemburg, Sweden and Czechoslovakia exceeded their production of 1938, and Poland almost equalled it, although none of these countries, except perhaps Sweden, attained its output of 1937.

Near Record Output—Taking the world as a whole, estimates indicate that, excepting the war year 1943, output in 1947 reached a record for steel, with 140,390,000 gross tons. This is due, of course, to the record peacetime contribution of the United States.

In spite of this considerable improvement, the cry for steel continues from all directions. If one selects the immediate prewar year of greatest activity for each of the European producing countries (1937 or 1939) the total of these figures, which amounts to some 58 million tons, gives a measure of the production of which these countries taken together are capable. Compared with the estimated output of these same countries in 1947, there is a gap of approximately 23,500,000 tons.

Explains Shortage—That explains the serious shortage of steel in Europe, but there is the additional factor that reconstruction has only begun, and stocks of steel are depleted.

In Great Britain first priority is given coal mining industry requirements—coal production being the basic problem facing the nation. Shipbuilding has been stepped up due to the importance of shipbuilding to the export drive. The automobile industry also is receiving a larger allocation of steel to boost exports.

Other Industries Helped—In view of the importance of British exports, principally to hard currency countries, certain other consuming industries, such as machine tools, machinery and electrical equipment, which had previously had their allocation of steel reduced, have been given a higher quota. A certain tonnage of finished steel products, such as merchant bars and sections, plates and sheets, tubes and tin plate, is also made available for export.

Similar In France—In France the situation is similar, except that reconstruction and modernization of works rank high in the priorities list. Steel for export, however, remains in the background. Exports in 1947 barely exceeded 200,000 tons, whereas nearly 2 million tons were exported in 1937.

Conditions are different in Belgium, where a substantial proportion of steel products is earmarked for export, and the remainder is left to the domestic market with comparative freedom of distribution.

Two Reasons Advanced—The main reasons for the gap between available supplies and existing demand are of two kinds: 1—Intensification of the requirements from direct users and from the consumer industries; 2—the lack of coal. In Great Britain a target of 200 million tons of coal for 1947 seemed hardly likely to be reached. In France, output of coal is almost on prewar level, but imports are below prewar.

Other factors affecting steel production are: Insufficient manpower, particularly in Central Europe, and transport difficulties.

The gap of 23,500,000 tons of steel between output of Europe in 1947 and output in the most favorable prewar years is almost equivalent to the production of which Germany was capable in 1938 and 1939. Allowing for the 3,500,000 tons produced in occupied Germany in 1947, there would have been some 20 million tons available from that source, were German steelworks capable of producing at the prewar rate.

Plans for reconstruction, modernization and expansion of the steel industry have been made in all major nations. The British plan covers a 5-year period, at total cost of about 200 million pounds ($800 million). When completed, it should increase steel ingot capacity from 14 million tons to almost 16 million tons. Pig iron capacity would be increased from 7,320,000 to 8,-

itical dissension and widespread or discord hampered European re-ery in 1947. At left is shown rally workers at Renault automobile nt in Paris during strike for wage increase

860,000 tons. New rolling mills will increase rolling capacity substantially.

Rebuilding in France — In France steel plant rebuilding and modernizing forms part of the Monnet plan for national reconstruction. It is proposed to increase ingot capacity by 2 million tons to 13,500,000 tons by 1951; further expansion at a later date to 15 million tons is envisioned. Marked expansion of rolling mill capacity also is provided for, including two continuous strip mills.

Control of the iron and steel industry by government is a feature of the postwar European economy. In Czechoslovakia and Poland the industry is, to large extent, nationalized. In France there is allocation of raw materials, quotas in regard to distribution of finished products and price control, but talk of nationalization has subsided for the time being. In Belgium the industry probably enjoys more freedom than in any other country, the only control consisting of an overall quota established each quarter for steel products for the home market and the fixing of maximum prices.

In Great Britain the situation is more complex. There is at present strict control on distribution from the raw material to the finished product and control of prices. While nationalization has not been included in the parliamentary program of the current session, the leftist element of the Labor party insists a bill for nationalization of the steel industry be passed in time to become law before this Parliament ends in 1950. The final outcome is still uncertain.

Export Trade Divided—Iron and steel export trade in Europe is mainly divided between the Belgo-Luxemburg economic unit and Great Britain, the former having outstripped the latter. In the first eight months of 1947 Belgium and Luxemburg exported 1,395,000 tons; British exports were 1,259,000 tons. In the corresponding period of 1946 Great Britain came first with 1,629,000 tons, compared with 940,000 tons for Belgium and Luxemburg. French exports in the first nine months of 1947 only reached 150,000 tons, whereas such exports for all of 1939 totalled 1,612,770 tons. A small amount of export business is being done by Czechoslovakia, Poland and Italy.

Reflecting higher wages and raw material costs, as well as increases in freight rates, steel prices advanced during 1947. In Great Britain the increase ranged from 5 to 6 per cent over prices of August, 1946. The new prices are, on the average, 60 per cent above prices ruling in 1938. A similar rise took place during the year in Belgium and other countries. In Belgium, however, there was a slight overall reduction toward the end of the year, but at the same time a 3 per cent tax on export prices was added. French prices advanced 30 to 40 per cent in March, and again an average of 40 per cent on Nov. 1.

Technical Developments—Technical developments are being pushed in Europe. New processes are being investigated, such as use of oxygen in furnaces. In Great Britain investigations are being made on experimental blast furnaces and converters.

While 1947 has been a difficult and disappointing year for Europe, some progress was made in various directions. What of 1948? The report of the Committee of European Economic Co-operation gives production targets, and steps to be taken to achieve these, for the next four years up to 1951. Insofar as 1948 is concerned, production of crude steel should be stepped up to 42,300,000 metric tons for the participating countries and western Germany, indicating an approximate increase of some 40 per cent above 1947. If production of non-participating countries is included, European output, exclusive of Soviet Russia, should attain some 48 million tons of steel in 1948. The committee's report estimates that for 1948 the participating countries will require imports of crude and semifinished steel to the extent of 2,490,000 tons in actual weight, and 4,839,000 tons of finished steel products.

Experience has taught that problems can be solved on paper by setting up targets, but these are not necessarily attained. The signs are there, however, to indicate that, at all events, 1948 will register advances in production, technique and efficiency, thus giving fair promise of a forward step toward general improvement.

No reliable information has filtered through the iron curtain on Russian production, but there is every reason to believe Russian works are keeping step with the rest of the world.

BRITISH... Making Progress

By J. A. HORTON
British Correspondent, STEEL

REMARKABLE recovery has been made in British iron and steel since the fuel crisis early in 1947. During the crisis output fell to an annual rate of 10 million ingot tons compared with 12.7 million tons in 1946, and the rate of 10 million tons was less than in any year since 1935.

A target of 14 million tons for 1948 has been set, but throughout October, 1947, production ran at an annual rate of 14,310,000 tons, the highest ever achieved in the industry.

To Revise Controls — The government has approved revision of control machinery to close the big gap between allocations and deliveries. Fuel output has not reached the stage where supplies can be assured for the winter. It is hoped to obtain weekly production of 3,750,000 tons of coal for the six months ending May 1, 1948, making a total of 97 million tons, to which it is expected to add 4,250,000 tons of opencast coal. Coal stock building increased during the summer due to reduced consumption, elimination of exports and an increase in imports.

It is intended to commence export of coal in 1948 to the extent of 6 million tons, but much will depend upon availability of manpower. In October mine labor had dropped to 715,000

compared with the July peak of 719,000. Output per man shift has been going up, however, and as the men have agreed to work longer hours, extra output should result.

Shortage of Cars—Since the war the railroads have operated under extreme difficulty, principally due to a shortage of freight cars. The railroads are to be given steel for their 1948 program on the basis of 600 locomotives and 48,000 freight cars. The steel allotted for rails amounts to 250,000 tons. Difficulties of the railroads are indicated by the fact 48,696 fewer freight cars are in use than in 1946, and 16.5 per cent of cars are awaiting repairs.

Castings Trade Gains — The light castings trade since the war has had a tremendous influx of business in connection with building, but plans of the government in the all-out export drive contemplated for 1948 will eliminate to certain extent the tonnage of such castings.

Imports of steel are on the increase, and up to the end of September totaled 411,331 tons compared with 373,186 tons in the same period of 1946. The two principal items in these imports were 99,404 tons of steel ingots and 170,566 tons of semifinished steel.

Steel exports up to the end of September totaled 1,413,623 tons against 1,766,245 tons in the same period of 1946, and the largest amount, 121,548 tons, went to the Union of South Africa.

Auto Exports Rise—The greatest value yet achieved for automobile exports amounting to 3,770,000 pounds ($15,080,000) was reached in September, although the number exported was 400 fewer than the July record of more than 13,800.

It is hoped to increase steel allocation for the automobile industry by 10 per cent. The export target for automobiles has been set at 5 million pounds ($20 million) a month immediately and 6,400,000 pounds ($25,600,000) at the end of 1948, comparing with a level in the last quarter of 1946 of 2,600,000 pounds ($10,400,000). With current automobile production running at 25,000 units, the program is to export 20,500 or 82 per cent of this figure by June, 1948. By December, 1948, the export target is to rise to 26,300 units a month.

Official export plans for the engineering industry indicate an increase in exports from about 30 million pounds ($120 million) a month (166 per cent of 1938) in the last quarter of 1946 to 42 million pounds ($168 million) a month (236 per cent of 1938) at the end of 1948.

Nationalization No Nearer — Nationalization of the steel industry is no nearer than it was a year ago, and it may well be that it will be postponed until after the economic crisis, although certain sections of the government are bent on carrying it out during the life of the present Parliament. It has not prevented schemes of reconstruction being carried out, or at any rate a start being made on some of those of great magnitude.

Shipbuilding steel supplies have been cut and this raises doubts whether sufficient shipping may be available for the increase in the exports. Progress of the industry is indicated by the fact in October a greater number of important British liners was launched than in any other month in the last two years.

Iron and steel prices were raised once during 1947, at the beginning of October, to meet increases in the price of coal, coke and fuel oil during September and the advance of railway rates on Oct. 1. The advance ranged from 15s ($3) a ton for semifinished steel to 18s 6d ($3.70) a ton on plates and heavy sections, with corresponding increases for other products.

FRANCE—BELGIUM...

THE PAST year was marked by improvement in the French iron and steel industry. Production increased and the gain would have been more marked had more coal been available, especially from the Ruhr basin.

It is estimated France has iron ore reserves amounting to seven billion tons, second only to those of the United States. The question of ore supply is, therefore, no problem for France.

By LEON JAUDOIN and JACQUES FOULON

French and Belgian Correspondents, STEEL

The nation's position is quite different in regard to coal. France has considerable coal reserves, but only a small proportion is suitable for coke.

During 1947, French steel output made considerable progress. At the end of September average monthly output of 1938 was exceeded for crude steel, rolled products and electric steel; production of open-hearth steel was higher than in 1938, but output of basic bessemer steel was slightly below.

There are in France 137 blast furnaces, of which 65 were operating late in the year, and 122 open-hearth steel furnaces, of which 65 were operating. More open-hearth steel could have been produced had it not been for difficulties in regard to scrap.

Prices Fluctuate — Price fluctuations in the French steel industry followed the government's economic policy. At the beginning of the year a 10 per cent price reduction was decreed, this to be done in two stages. Prices, however, were hardly affected at the time, though the government maintained a policy of rigid control over the economy.

In February and March the General Confederation of Workers demanded a minimum basic wage of 7000 francs ($58.33). Without waiting for negotiations to bear fruit many workers started strikes. In May a strike started at the nationalized Renault automobile works near Paris; this spread to the railroad employees, and for a time a general strike was

feared. A general overall increase of 11 per cent in wages was agreed upon. However, at the time of the municipal elections in October, when many communists lost their seats to the recently formed de Gaulle movement, a wave of strikes started and spread over various parts of the country, accompanied by riots in some places and, toward the end of the year, the situation was so serious because of work stoppages as to verge on civil war.

Modernization Pushed—Modernization of the industry under the Monnet plan is being gradually pursued. The first continuous strip mill to be installed in part at Denain-Anzin and part at the Forges et Acieries de Nord-Est has been ordered from the United States, and it is thought it will be in operation in about two years.

Belgium-Luxemburg

APPRECIABLE advance was made by Belgium and Luxemburg during 1947 in steel production, exporting and engineering activities. Belgian steel ingot and castings output was increased 18 per cent over 1946. Luxemburg output was up 33 per cent.

Production would have been greater if more coal and coke had been available. Production of coal in Belgium was almost at prewar scale, but imports, especially of coke, were substantially lower.

The manpower problem in the mines had been solved by use of German prisoners of war, but these have now returned and Belgium is importing foreign labor, mainly Italian.

Large Orders In Hand—The steel industry has large orders in hand for the domestic market. It is estimated war damage repairs are about half completed.

Both Belgian and Luxemburg industries are actively exporting.

All the large concerns plan considerable expansion.

Leads As Exporter — Apart from exports of manufactured products, the Belgo-Luxemburg economic unit took first place in Europe as an exporter of steel products.

Imports of iron and steel averaged about 10,000 tons per month. While total exports of all kinds from Belgium and Luxemburg to the United States amounted to about $25 million, the American market being eighth in importance, exports of steel to America were practically negligible.

Position Summarized — The position of the steel industry at the end of 1947 can be summarized as follows: In Belgium there are 13 main concerns, situated mainly in the Liege and Charleroi districts. These works have together 55 blast furnaces, of which 33 were in operation in October. These furnaces have a capacity ranging from 160 to 500 metric tons. The works also have 53 basic bessemer converters of from 12 to 30 tons, 25 open-hearth furnaces up to 80 tons capacity, and 8 electric furnaces up to 25 tons.

In Luxemburg there are three large companies, situated in the southern part of the country, which now own 32 blast furnaces of a capacity ranging from 160 to 500 tons. Of these, 17 were operating in October. The Luxemburg works have 25 basic bessemer converters, 4 electric furnaces, and a number of open-hearth furnaces.

Output of steel ingots and castings in Belgium is estimated at 2,700,000 metric tons, compared with 2,284,000 tons in 1946, 3,110,000 tons in 1939, and 2,279,000 tons in 1938.

Crude Steel Output Up — For Luxemburg, output of crude steel in 1947 is estimated at 1,700,000 metric tons, compared with 1,294,000 tons in 1946, 1,762,000 tons in 1939 and 1,437,000 tons in 1938.

ITALY...

By ANTONIO GIORDANO
Special Correspondent, STEEL

REVIVAL of the Italian steel industry is evidenced by the fact output of steel ingots and castings during 1947 is estimated at 1,800,000 metric tons, 57 per cent more than in 1946, and corresponding to 78 per cent of 1938 production.

Output of pig iron was about 475,000 metric tons, compared with 174,818 tons in 1946 and 2,322,500 tons in 1938.

Of total steel output in 1946, electric steel accounted for 52 per cent, but in 1947, proportion of electric steel dropped to 42 per cent, the remainder being open hearth grade.

Agreements were concluded for cooperation between the Italian iron and steel industry and Austrian and Polish works.

Experiment on Ores — The Fiat steelworks at Turin carried out successful experiments in using in their electric furnace dried lignite with Austrian ores. Arrangements were also made for reducing Austrian ores for production of manganese steel by the bessemer process. According to reports it would be possible to obtain a yield of 80 per cent of manganese contained in the Austrian ores.

Plan Expansion — Viewing the future of the Italian iron and steel industry, importance is attached to the report by the Italian delegation to the Paris conference which discussed the Marshall Plan. According to this report the plan for the expansion of the Italian industry may be summarized as follows:

(Thousands of Metric Tons)

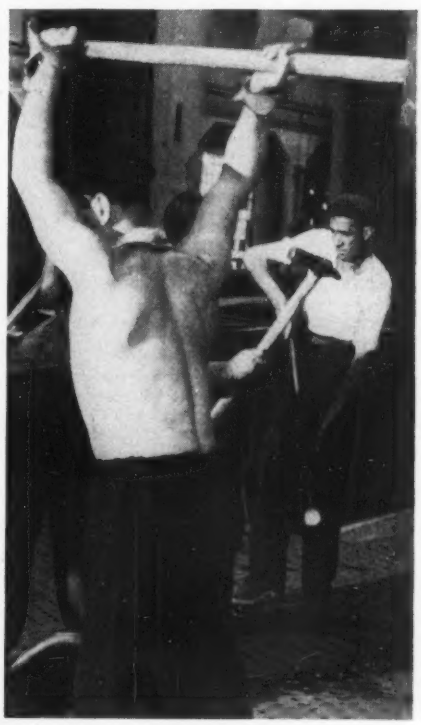
	Pig Iron Output	Imports
1948.....	680	300
1949.....	950	150
1950.....	1,250	...
1951.....	1,570	...

(Thousands of Metric Tons)

	Crude Steel Output	Crude Steel Imports	Finished Steel Output	Finished Steel Imports
1948.....	2,500	700	2,450	150
1949.....	2,670	910	2,740	175
1950.....	2,830	1,080	2,990	195
1951.....	3,000	1,300	3,280	225

In order to carry out this expansion the Italian industry would require renovation of its oldest plants. Carrying out of reconstruction and new building programs would further require importation of additional plant and machinery.

Italy has signed an agreement with the United States and Great Britain



according to which Italy is to be left with the Italian naval craft which should have been transferred under the peace treaty to America and Britain. This tonnage, however, must be scrapped.

World Pig Iron, Steel Ingot Production

Steel Ingot and Castings Production

Gross Tons

	1947 (a)	1946	1945	1944	1943	1942	1941	1940
United States	75,625,000	59,466,699	71,162,182	80,037,116	79,318,314	76,813,429	73,963,624	60,518,419
Canada	2,650,000	2,088,000	2,568,000	2,712,000	2,664,000	2,748,000	2,424,000	2,016,000
Great Britain	12,500,000	12,695,300	11,825,000	12,142,200	13,031,000	12,941,700	12,312,200	12,975,300
France (b)	5,725,000	4,337,500	1,635,000	3,042,500	5,045,000	4,415,000	4,240,000	4,342,000
Saar	650,000	included in Germany						
Belgium	2,675,000	2,247,500	725,000	612,000	1,644,000	1,356,000	1,596,000	1,860,000
Luxemburg	1,675,000	1,273,300	260,000	.....	.....	.....	.....	1,296,000
Italy	1,700,000	1,134,500	300,000	1,080,000	1,900,000	1,900,000	1,968,000	2,265,000
Spain	550,000	590,000	550,000	625,000	650,000	590,000	565,000	685,000
Sweden	1,150,000	1,182,700	1,175,000	1,175,000	1,200,000	1,210,000	1,140,000	1,130,000
Germany (c)	3,500,000	2,940,200	900,000	18,500,000	21,000,000	20,750,000	21,000,000	18,900,000
Austria	325,000	184,000	.....	.....	.....	.....	.....	.....
Czechoslovakia	2,200,000	1,645,200	935,000	.....	.....	.....	.....	.....
Poland	1,475,000	1,200,000	525,000	1,350,000	1,475,000	.....	.....	.....
Hungary	600,000	350,000	.....	.....	.....	.....	.....	.....
Russia	22,000,000	20,000,000	18,000,000	14,000,000	12,000,000	11,000,000	15,000,000	18,000,000
Japan (d)	850,000	552,000	1,050,000	5,755,000	7,708,000	6,931,000	6,725,000	6,746,000
India	1,300,000	1,296,000	1,355,000	1,370,000	1,400,000	1,340,000	1,400,000	1,300,000
Australia	1,175,000	1,255,500	1,345,000	.....	.....	.....	.....	.....
South Africa	600,000	504,000	525,000	480,000	410,000	340,000	340,000	360,000
Miscellaneous	1,200,000	950,000	800,000	.....	.....	.....	.....	.....
WORLD TOTAL	140,125,000	115,892,399	115,635,182	.....	.....	.....	.....	.....

(a) Estimated.
(b) Without Alsace-Lorraine from 1940 to 1945
(c) Includes Austrian production from 1938 to 1945. All occupied zones of Germany proper since September 1945 but without Saar for 1947
(d) Home Islands only for 1945 and 1946
Note: Production figures not given are not available.

Pig Iron and Ferroalloy Production

Gross Tons

	1947 (a)	1946	1945	1944	1943	1942	1941	1940
United States	52,900,000	40,463,000	49,034,845	56,130,534	56,044,595	53,555,497	45,042,023	42,320,011
Canada	1,870,000	1,357,000	1,750,000	1,800,000	1,760,000	1,950,000	1,560,000	1,300,000
Great Britain	7,500,000	7,761,200	7,107,400	6,736,500	7,186,900	7,725,600	7,392,500	8,204,600
France (b)	4,850,000	3,444,000	1,164,000	2,847,000	4,842,000	3,776,500	3,297,400	3,624,000
Saar	650,000	included in Germany						
Belgium	2,600,000	2,136,265	717,000	696,000	1,608,000	1,248,000	1,404,000	1,764,000
Luxemburg	1,775,000	1,343,160	313,000	.....	.....	.....	.....	.....
Italy	475,000	172,200	78,000	.....	.....	985,000	985,000	985,000
Spain	485,000	483,000	461,000	540,000	590,000	540,000	530,000	575,000
Sweden	685,000	670,000	770,000	850,000	790,000	755,000	730,000	780,000
Germany (c)	2,300,000	2,600,000	350,000	13,500,000	16,200,000	15,500,000	15,700,000	14,200,000
Austria	250,000	57,000	.....	.....	.....	.....	.....	.....
Czechoslovakia	1,400,000	945,000	567,000	.....	.....	.....	.....	.....
Poland	800,000	715,000	240,000	.....	.....	.....	.....	.....
Hungary	300,000	157,000	78,000	.....	.....	.....	.....	.....
Russia	18,000,000	17,000,000	17,000,000	15,000,000	10,000,000	7,000,000	13,000,000	15,000,000
Japan (d)	350,000	150,000	500,000	2,523,000	3,743,000	4,050,000	4,023,000	3,362,000
India	1,500,000	1,327,000	1,380,000	1,428,000	1,764,000	1,848,000	2,040,000	2,016,000
Australia	1,125,000	1,000,000	1,115,000	.....	.....	.....	.....	.....
South Africa	625,000	550,000	550,000	455,000	468,000	360,000	312,000	300,000
Miscellaneous	1,000,000	900,000	800,000	.....	.....	.....	.....	.....
WORLD TOTAL	101,440,000	83,230,825	83,975,245	.....	.....	.....	.....	.....

(a) Estimated.
(b) Without Alsace Lorraine from 1940 to 1945
(c) Includes Austrian production from 1938 to 1945. All occupied zones of Germany proper since September 1945 but without Saar for 1947
(d) Home Islands only for 1945 and 1946.
Note: Production figures not given are not available.

French Iron and Steel Prices

(Prices per metric ton, Longwy basis)

	—Jan. 1, 1947—		—Nov. 1, 1947—	
	Francs	Dollars	Francs	Dollars
FINISHED STEEL				
Tin Plates	22,147	$184.55	34,250	$285.41
Sheets, Medium, 2 to 5 mm.				
Basic Bessemer	8,651	72.09	14,920	124.33
Open Hearth	9,383	78.16	17,000	141.66
Bars, Merchant				
Basic Bessemer	6,400	53.33	11,820	98.50
Open Hearth	7,000	58.33	13,340	111.16
Plates, 5 mm. and over				
Basic Bessemer	7,883	65.69	14,300	119.16
Open Hearth	8,581	71.50	16,100	134.16
Rails	7,883	65.69	12,520	104.33
Structural Steel				
Basic Bessemer	6,169	51.48	10,620	88.50
Open Hearth	6,896	57.46	12,520	104.33
SEMIFINISHED STEEL				
Basic Bessemer	4,875	40.62	8,750	72.91
Open Hearth	5,387	44.89	10,020	83.50
PIG IRON				
Hematite	3,750	31.25	8,210	68.41

British Iron and Steel Prices

(Dollars per gross ton)

	January, 1947	November, 1947
FINISHED STEEL		
Tin Plate, fot makers' works, per box	$ 7.08	$ 7.27
Sheets, 24 Gage, 4-Ton Lots		
Black	100.00	104.52
Galvanized, corrugated	123.81	137.38
Bars		
Merchant, under 3 inches	72.96	77.18
Plates		
Ship, del. Northern Area and Scotland	66.23	69.94
Boiler, del. Midlands	70.25	73.96
Rails, 60-lb and over, 500-ton lots	62.71	65.92
Structural Steel	63.11	66.93
SEMIFINISHED		
Billets, Forging, basic, soft	58.29	61.30
PIG IRON		
Foundry, 2.5 to 3% Si., del. Middlesbrough	33.01	37.15

U. S. Pig Iron, Steel Ingot Production

Data compiled by American Iron & Steel Institute; estimates by STEEL

Pig Iron and Ferroalloy Production

Net Tons

	1929		1939		1940		1941		1942	
	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.
Jan.	3,877,079	125,067	2,467,062	79,583	4,066,544	131,179	4,730,276	152,589	5,061,380	163,270
Feb.	3,636,669	129,880	2,337,993	83,499	3,346,356	115,389	4,270,869	152,530	4,578,629	163,521
Mar.	4,186,748	135,056	2,711,034	87,453	3,312,563	106,857	4,766,949	153,772	5,134,049	165,614
Apr.	4,134,835	137,828	2,332,553	77,752	3,181,031	106,038	4,404,599	146,820	4,974,960	165,832
May	4,398,233	141,878	1,954,213	63,039	3,539,145	114,166	4,660,156	150,327	5,151,771	166,186
June	4,193,005	139,767	2,404,341	80,145	3,855,080	128,503	4,615,083	153,836	5,014,062	167,135
July	4,268,500	137,693	2,669,348	86,108	4,102,501	132,338	4,830,259	155,814	5,129,300	165,461
Aug.	4,227,830	136,381	3,010,362	97,108	4,276,564	137,953	4,848,682	156,409	5,087,235	164,104
Sept.	3,948,117	131,604	3,249,528	108,318	4,214,539	140,485	4,785,380	159,513	5,015,601	167,187
Oct.	4,050,812	130,671	4,093,258	132,040	4,479,712	144,507	4,924,076	158,841	5,314,759	171,443
Nov.	3,596,398	119,880	4,197,100	139,903	4,439,643	147,988	4,771,237	159,041	5,161,978	172,066
Dec.	3,209,435	103,530	4,250,305	137,106	4,584,851	147,898	5,079,038	163,840	5,279,580	170,309
Year	47,727,661	130,759	35,677,097	97,745	47,398,529	129,502	56,686,604	155,304	60,903,304	166,857

	1943		1944		1945		1946		1947	
	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.
Jan.	5,278,699	170,280	5,281,464	170,369	5,007,680	161,538	2,644,552	85,308	5,071,369	163,592
Feb.	4,850,457	173,229	5,088,013	175,445	4,625,407	165,192	1,147,564	40,984	4,549,628	162,485
Mar.	5,398,655	174,150	5,439,240	175,459	5,290,452	170,659	4,423,916	142,706	5,122,857	165,253
Apr.	5,119,634	170,654	5,248,410	174,947	4,848,322	161,611	3,613,560	120,652	4,829,717	160,991
May	5,262,182	169,747	5,347,866	172,511	5,078,722	163,829	2,274,545	73,372	5,081,131	163,907
June	4,920,739	164,025	5,061,621	168,721	4,667,675	155,589	3,682,273	122,742	4,809,809	160,327
July	5,107,199	164,748	5,161,814	166,510	4,875,081	157,260	4,705,277	151,783	4,584,614	147,890
Aug.	5,399,087	174,164	5,215,222	168,233	4,311,209	139,071	4,897,980	157,999	4,916,557	158,598
Sept.	5,309,972	176,999	4,992,883	166,429	4,289,414	142,980	4,687,390	156,246	4,800,620	160,021
Oct.	5,408,192	174,457	5,200,175	167,747	3,450,789	111,316	4,814,561	155,308	5,227,747	168,637
Nov.	5,417,759	180,592	5,425,591	180,853	4,088,620	136,287	4,434,711	147,824	5,041,535*	168,051*
Dec.	5,297,374	170,883	5,403,899	174,319	4,385,658	141,473	3,992,165	128,779	5,194,308*	162,630*
Year	62,769,947	171,971	62,866,198	171,763	54,919,029	150,462	45,318,494	124,159	59,251,100*	161,865*

* Estimated.

Steel Ingot Production and Operating Rates

Net Tons

	1940			1941			1942			1943		
	Total Output	Weekly Average	% of Capacity	Total Output	Weekly Average	% of Capacity	Total Output	Weekly Average	% of Capacity	Total Output	Weekly Average	% of Capacity
Jan.	5,764,811	1,301,312	83.4	6,922,545	1,562,651	96.8	7,112,272	1,605,479	94.5	7,424,534	1,675,967	96.8
Feb.	4,525,866	1,091,204	70.0	6,230,528	1,557,632	96.5	6,512,687	1,628,172	95.9	6,824,615	1,706,154	98.5
Mar.	4,389,250	990,801	63.5	7,124,202	1,608,172	99.6	7,392,284	1,668,687	98.2	7,674,591	1,732,413	100.0
Apr.	4,100,573	955,844	61.2	6,754,367	1,574,445	97.6	7,121,457	1,660,013	97.7	7,373,715	1,718,815	99.3
May	4,967,858	1,121,413	71.8	7,044,762	1,590,240	98.5	7,382,750	1,666,535	98.1	7,549,703	1,704,222	98.4
June	5,657,529	1,318,771	84.5	6,792,941	1,583,436	98.1	7,015,466	1,635,307	96.3	7,039,365	1,640,878	94.8
July	5,724,712	1,295,184	83.0	6,812,414	1,541,271	93.3	7,145,125	1,616,545	94.5	7,407,888	1,675,993	96.2
Aug.	6,186,478	1,396,496	89.5	6,997,692	1,579,614	95.6	7,227,824	1,631,563	95.4	7,586,477	1,712,523	98.3
Sept.	6,056,339	1,415,032	90.6	6,811,944	1,591,576	96.3	7,057,684	1,648,992	96.4	7,514,351	1,755,689	100.7
Oct.	6,644,644	1,499,920	96.1	7,236,270	1,633,469	98.9	7,579,691	1,710,991	100.0	7,814,130	1,763,912	101.2
Nov.	6,469,206	1,507,973	96.6	6,961,079	1,622,629	98.2	7,179,980	1,673,654	97.8	7,371,987	1,718,412	98.6
Dec.	6,495,456	1,469,561	94.1	7,150,515	1,617,764	97.9	7,304,711	1,652,650	96.6	7,255,156	1,641,439	94.2
Year	66,982,686	1,281,230	82.1	82,839,259	1,588,785	97.3	86,031,931	1,650,018	96.8	88,836,512	1,703,807	98.1

	1944			1945			1946			1947*		
	Total Output	Weekly Average	% of Capacity	Total Output	Weekly Average	% of Capacity	Total Output	Weekly Average	% of Capacity	Total Output	Weekly Average	% of Capacity
Jan.	7,592,605	1,713,906	95.7	7,204,314	1,626,256	88.8	3,872,887	874,241	49.6	7,213,246	1,628,272	93.0
Feb.	7,194,011	1,737,684	97.0	6,652,767	1,663,192	90.8	1,392,682	348,171	19.8	6,422,062	1,605,515	91.7
Mar.	7,826,259	1,766,650	98.6	7,705,931	1,739,488	95.0	6,508,764	1,469,247	83.3	7,307,486	1,649,545	94.3
Apr.	7,593,690	1,770,091	98.8	7,289,889	1,699,275	92.8	5,861,195	1,366,246	77.5	7,042,697	1,641,654	93.8
May	7,702,578	1,738,731	97.1	7,449,669	1,681,641	91.8	4,072,620	919,327	52.2	7,329,497	1,654,514	94.5
June	7,234,259	1,686,307	94.1	6,840,524	1,594,528	87.1	5,625,773	1,311,369	74.4	6,968,665	1,624,397	92.8
July	7,498,390	1,696,469	94.3	6,985,573	1,580,447	86.3	6,618,683	1,497,440	84.9	6,570,154	1,486,460	84.9
Aug.	7,498,915	1,692,757	94.1	5,735,319	1,294,654	70.7	6,924,522	1,563,098	88.7	6,982,086	1,576,092	90.1
Sept.	7,235,113	1,690,447	94.0	5,982,477	1,397,775	76.3	6,555,566	1,531,674	86.9	6,788,642	1,586,131	90.6
Oct.	7,620,887	1,720,290	95.6	5,596,778	1,263,381	69.0	6,951,742	1,569,242	89.0	7,560,365	1,706,629	97.5
Nov.	7,278,721	1,696,672	94.3	6,200,468	1,445,331	78.9	6,457,771	1,505,308	85.4	7,249,523	1,689,866	96.6
Dec.	7,366,172	1,666,555	92.6	6,057,939	1,370,575	74.8	5,760,501	1,303,281	73.9	7,265,577*	1,643,796*	93.9*
Year	89,641,600	1,714,644	95.5	79,701,648	1,528,609	83.5	66,602,706	1,277,382	72.5	84,700,000*	1,624,473*	92.8*

Compiled by American Iron & Steel Institute. Figures include electric ingot and steel for castings production but exclude: Crucible steel output which totaled 1024 tons in 1940, 2313 tons in 1941, 2010 tons in 1942, 146 tons in 1943 and 25 tons in 1944; and steel for castings produced in foundries operated by companies which do not produce ingots. Figures are based on reports of companies which made 100 per cent of the bessemer and about 98 per cent of open hearth and 87 per cent of electric ingot and steel for castings production. Annual capacities as of Jan. 1, 1947, were as follows: Open hearth 81,010,990 net tons, bessemer 5,154,000 net tons, electric 5,076,240 net tons, total 91,241,230 net tons. *Estimated.

Average Monthly Quotations in 1947

Finished Steel Prices Are Cents Per Pound and Semifinished, Dollars Per Gross ton, Unless Otherwise Noted; Coke, Dollars Per Net Ton; Other Products, Dollars Per Gross Ton. All Prices Are Base or Furnace, Unless Otherwise Noted.

Pittsburgh

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Structural Shapes	2.46c	2.50c	2.50c	2.50c	2.50c	2.50c	2.56c	2.80c	2.80c	2.80c	2.80c	2.80c
Plates	2.61	2.65	2.65	2.65	2.65	2.65	2.71	2.95	2.95	2.95	2.95	2.95
Bars, Hot-Rolled	2.60	2.60	2.60	2.60	2.60	2.60	2.66	2.90	2.90	2.90	2.90	2.90
Bars, Cold-Finished	3.20	3.20	3.20	3.20	3.20	3.20	3.27	3.55	3.55	3.55	3.55	3.55
Sheets, Hot-Rolled	2.50	2.50	2.50	2.50	2.50	2.50	2.56	2.80	2.80	2.80	2.80	2.80
Sheets, No. 10 Galvanized	3.55	3.55	3.55	3.55	3.55	3.55	3.63	3.90	3.90	3.90	3.90	3.90
Strip, Hot-Rolled	2.50	2.50	2.50	2.50	2.50	2.50	2.56	2.80	2.80	2.80	2.80	2.80
Strip, Cold-Rolled	3.20	3.20	3.20	3.20	3.20	3.20	3.27	3.55	3.55	3.55	3.55	3.55
Standard Spikes	4.075	4.075	4.075	4.075	4.075	4.075	3.345	4.25	4.25	4.49	4.85	4.85
Plain Wire	3.425	3.425	3.425	3.425	3.425	3.425	3.475	3.675	3.675	3.675	3.675	3.675
Wire Nails	4.062	4.125	4.125	4.125	4.125	4.125	3.975	4.25	4.25	4.25	4.625	4.625
Structural Rivets	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.65	5.65	5.65
Tin Plate (base box)	$5.75	$5.75	$5.75	$5.75	$5.75	$5.75	$5.75	$5.75	$5.75	$5.75	$5.75	$5.75
Pipe, steel, 1-3 inch, % discount (Base $200 per ton)	61¾	60½	60½	60½	60½	60½	60½	57	57	57	57	57
Pig Iron, Bessemer, Neville Island base	$31.00	$31.00	$34.00	$34.00	$34.00	$34.00	$35.20	$37.00	$37.00	$37.00	$37.00	$37.00
Pig Iron, Basic, Neville Island base	30.00	30.00	33.00	33.00	33.00	33.00	34.20	36.00	36.00	36.00	36.00	36.00
Pig Iron, No. 2 Foundry, Neville Island base	30.50	30.50	33.50	33.50	33.50	33.50	34.70	36.50	36.50	36.50	36.50	36.50
Pig Iron, Malleable, Neville Island base	30.50	30.50	33.50	33.50	33.50	33.50	34.70	36.50	36.50	36.50	36.50	36.50
Ferrosilicon, Bessemer, 10%, Jackson, O., base	44.00	46.00	47.875	48.50	48.50	49.50	51.45	55.25	55.25	55.25	55.25	55.25
Billets, Bessemer and Open-Hearth	41.40	42.00	42.00	42.00	42.00	42.00	43.60	47.50	47.50	47.50	47.50	47.50
Sheet Bars, Bessemer and Open-Hearth	47.60	50.00	50.00	50.00	50.00	50.00	52.00	60.00	60.00	60.00	60.00	60.00
Wire Rods (per 100 lb)	2.55	2.55	2.55	2.55	2.55	2.55	2.63	2.925	2.925	2.925	3.05	3.05
Furnace Coke, spot	8.81	8.875	8.875	9.06	9.125	9.56	11.20	12.00	12.00	12.15	12.25	12.25
Foundry Coke, spot	9.81	10.00	10.375	10.375	10.375	10.75	13.05	14.50	14.50	14.50	14.50	14.50
Steel Scrap, Heavy Melting	32.50	34.40	37.25	35.81	30.00	32.44	37.20	39.50	38.00	39.90	40.00	40.00
Scrap, Low-Phosphorous	35.60	38.00	41.25	42.50	37.40	39.06	40.60	47.75	45.30	46.25	47.75	47.75
Scrap, No. 1 cast	43.10	42.90	43.625	43.56	40.50	40.50	41.00	42.55	43.25	44.90	49.30	53.00

Chicago

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Bars	2.60c	2.60c	2.60c	2.60c	2.60c	2.60c	2.66c	2.90c	2.90c	2.90c	2.90c	2.90c
Sheets, Cold-Rolled	3.20	3.20	3.20	3.20	3.20	3.20	3.27	3.55	3.55	3.55	3.55	3.55
Plates	2.62	2.65	2.65	2.65	2.65	2.65	2.71	2.95	2.95	2.95	2.95	2.95
Structural Shapes	2.47	2.50	2.50	2.50	2.50	2.50	2.56	2.80	2.80	2.80	2.80	2.80
Rail Steel Bars	2.60	2.775	2.775	2.775	2.775	2.775	2.925	3.60	3.70	3.70	3.70	3.70
Pig Iron, No. 2 Foundry	$30.50	$30.50	$33.00	$33.00	$33.00	$33.00	$34.20	$36.00	$36.00	$36.00	$36.00	$36.00
Pig Iron, Malleable	30.50	30.50	33.50	33.50	33.50	33.50	34.70	36.50	36.50	36.50	36.50	36.50
Charcoal Iron, Low Phos, fob Lyles, Tenn.	37.50	37.50	40.50	40.50	40.50	40.50	43.00	44.00	44.00	46.40	50.00	50.00
Steel Scrap, Heavy Melting	30.00	31.25	35.125	32.75	29.25	30.75	35.95	39.625	38.75	39.55	38.75	38.75
Rails for Rerolling	36.25	38.50	40.75	38.25	34.50	38.75	43.20	47.125	46.25	51.00	56.25	58.40
Cast Scrap, No. 1 Cupola	41.50	42.50	43.25	42.50	38.50	39.50	41.10	43.50	43.50	49.40	49.00	53.90

Eastern Pennsylvania

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Tank Plates, del. Philadelphia	2.77c	2.85c	2.85c	2.85c	2.85c	2.85c	2.85c	3.15c	3.15c	3.162c	3.17c	3.17c
Structural Shapes, del. Philadelphia	2.60	2.64	2.64	2.64	2.64	2.64	2.64	2.94	2.94	2.954	2.954	2.954
Bars, Steel, del. Philadelphia	2.975	2.98	2.98	2.98	2.98	2.98	2.98	3.28	3.28	3.301	3.318	3.318
Sheets, Hot-Rolled, del. Philadelphia	2.70	2.70	2.70	2.70	2.70	2.70	2.70	3.00	3.00	3.012	3.02	3.02
Pig Iron, Basic, del. Philadelphia	$31.99	$32.01	$34.26	$35.52	$35.52	$35.52	$36.47	$38.72	$38.72	$38.78	$38.84	$38.84
Pig Iron, No. 2 Foundry, del. Philadelphia	32.49	32.51	34.76	36.02	36.02	36.02	36.97	39.22	39.22	39.28	39.34	39.34
Pig Iron, Standard Low Phosphorus, delivered	37.46	38.16	39.96	41.16	41.16	41.16	41.97	44.22	44.22	44.30	44.38	44.38
Spiegeleisen, 19-21%, Palmerton, Pa., base	40.00	40.00	41.60	44.00	44.00	44.00	46.40	46.40	47.00	47.00	47.00	47.00
Steel Scrap, No. 1 Heavy Melting	31.00	33.25	38.50	33.50	30.00	34.31	38.06	38.35	36.75	39.25	42.40	42.10
Cast Iron Scrap, No. 1 Cupola	42.25	45.50	49.90	48.00	41.50	44.75	46.875	47.10	46.25	47.56	49.90	50.50

Coal Chemicals

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Benzol, per gallon, producers' plants, tank lots	15.00c	17.00c	17.00c	19.00c	19.00c	19.00c	19.00c	19.00c	19.00c	19.00c	19.00c	19.00c
Toluol, two degree, per gallon, delivered, tank lots	22.00	22.00	22.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
Solvent Naphtha, per gallon, delivered, tank lots	26.00	26.00	26.00	26.00	26.00	26.00	26.00	25.00	25.00	25.00	25.00	25.00
Xylol, per gallon, delivered, tank lots	22.00	22.00	22.00	23.00	23.00	23.00	23.00	25.00	25.00	25.00	25.00	25.00
Naphthalene, flakes and balls, per pound, producers' plants, barrels to jobbers	9.00	9.50	9.50	9.50	9.50	9.50	10.50	11.00	11.00	11.00	11.00	11.00
Phenol, per pound, producers' plants, less than car lots	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.75	12.75	12.75
Sulphate of Ammonia, per ton, bulk, fob Atlantic Seaboard	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$32.00	$35.00	$35.00	$35.00	$35.00

Nonferrous Metals

Prompt wholesale prices in cents per pound

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Tin, Straits, New York	70.000c	70.000c	70.000c	80.000c	80.000c	80.000c	80.000c	80.000c	80.000c	80.000c	80.000c	80.000c
Copper, Electrolytic, delivered Connecticut	19.600	20.000	21.130	21.500	21.650	21.700	21.500	21.500	21.500	21.500	21.500	21.500
Zinc, Prime Western, East St. Louis	10.500	10.500	10.500	10.500	10.500	10.500	10.500	10.500	10.500	10.500	10.500	10.500
Lead, open market, East St. Louis	12.730	13.069	14.825	14.825	14.825	14.825	14.825	14.825	14.825	14.825	14.825	14.825
Lead, open market, New York	12.910	13.250	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000
Aluminum, ingots, 99 per cent plus	15.00	15.00	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000
Antimony, domestic, bulk, cl., fob Laredo, Tex.	28.250	28.250	29.563	33.000	33.000	33.000	33.000	33.000	33.000	33.000	33.000	33.000
Nickel, electrolytic cathodes, 99.9%, base sizes, unpacked, fob refinery	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000

Finished Steel Price Record

Weighted Price Composite of Finished Steel, 1938-47

(In cents per pound, weighted on basis of actual monthly shipments of following 19 products representing 81 per cent of total steel shipments as reported by American Iron & Steel Institute: Heavy structural shapes; plates; standard rails; hot-rolled carbon bars; cold-finished carbon bars; black butt weld pipe and tubes; black lap weld pipe and tubes; black electric weld pipe and tubes; black seamless pipe and tubes; drawn wire; nails and staples; tin and terne plate; hot-rolled sheets; cold-rolled sheets; galvanized sheets; hot-rolled strip; and cold-rolled strip.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1947	3.07518	3.09137	3.10998	3.12077	3.11584	3.12729	3.20098	3.46652	3.45716	3.45536		
1946	2.68244†	2.77932†	2.87746	2.90762	2.95661	2.93140	2.88893	2.89610	2.87866	2.86140	2.87671	2.91932
1945	2.52622	2.53328	2.56960	2.58675	2.57560	2.63388	2.62278	2.64085	2.60738	2.61832	2.61465	2.61277
1944	2.41455	2.38787	2.42750	2.43493	2.44428	2.46683	2.45656	2.46272	2.44551	2.44848	2.45888	2.48509
1943	2.40218	2.41359	2.43678	2.42785	2.44941	2.47708	2.45880	2.45773	2.44293	2.40831	2.39672	2.38649
1942	2.61937	2.60060	2.58182	2.53328	2.51807	2.52583	2.44307	2.43337	2.39808	2.37038	2.36750	2.38793
1941	2.53976	2.54844	2.56232	2.57302	2.55214	2.58999	2.62522	2.68635	2.66776	2.66541	2.64321	2.63783
1940	*	*	2.62145	2.65357	2.66527	2.63468	2.60947	2.58036	2.56114	2.54836	2.54775	2.55476
1939	*	*	2.67207	*	*	2.69996	*	*	2.65411	*	*	2.60351
1938	*	*	2.97730	*	*	3.01353	*	*	2.73758	*	*	2.68443

† Weighted prices were determined on the basis of aggregate steel product tonnage shipped in both strike-affected months.
* Because monthly steel tonnages for sale were not available until April, 1940, weighted average steel prices for the quarter are given in the month of the quarter's end.

Finished Steel Price Changes, 1937-47

(Per net ton, Pittsburgh)

Week Ended	Sheets H.R.	Sheets C.R.	Sheets Gal.	Strip H.R.	Strip C.R.	Bars H.R.	Bars C.F.	Plates	Shapes	Basic Wire	Stand. Nails	Tin Plate
1947												
Nov. 8	....	....	....	....	....	....	....	....	....	....	$92.50	....
Aug. 2	$56.00	$71.00	$78.00	$56.00	$71.00	$58.00	$71.00	$59.00	$56.00	$73.50	85.00	....
July 26	....	....	....	....	....	....	....	....	51.50	....	75.00	....
Jan. 18	....	....	....	....	....	....	....	....	....	....	82.50	....
Jan. 11	....	....	....	....	....	....	....	54.50	50.00	....	....	....
Jan. 4	....	....	....	....	64.00	52.00	....	53.00	48.50	68.50	80.00	$116.00
1946												
Dec. 28	....	....	....	....	....	....	64.00	....	....	....	....	....
Dec. 14	50.00	64.00	71.00‡	50.00	61.00	....	....	....	....	....	....	....
June 15	....	....	....	....	....	....	....	....	....	....	75.00	....
Feb. 16†	48.50	65.50	81.00	48.00	61.00	50.00	62.00	50.00	47.00	61.00	65.00	105.00
1945												
Aug. 4	....	....	....	....	....	....	55.00	....	....	....	....	....
May 26	....	....	....	....	....	45.00	....	45.00	....	55.00	58.00	....
Jan. 13	44.00	....	64.00	....	....	....	....	44.00	....	....	56.00	....
1941												
Apr. 16*	42.00	61.00	70.00	42.00	56.00	43.00	53.00	42.00	42.00	52.00	51.00	100.00
1940												
May 4	42.00	61.00	....	42.00	56.00	....	....	....	....	....	....	....
Apr. 13	38.00	57.00	....	38.00	52.00	....	....	....	....	....	....	....
1939												
Dec. 2	42.00	....	....	42.00	....	....	....	....	....	....	....	....
Oct. 7	....	....	....	....	....	....	....	....	....	....	51.00	....
July 8	....	....	....	....	....	....	....	....	....	....	48.00	....
May 20	40.00	61.00	....	40.00	56.00	43.00	53.00	....	....	....	....	....
May 13	39.00	60.00	....	39.00	55.00	....	....	....	....	....	....	....
1938												
Nov. 22	....	....	....	....	....	....	....	....	....	....	....	100.00
July 2	43.00	64.00	70.00	....	59.00	....	54.00	....	....	52.00	49.00	....
June 25	42.00§	....	....	43.00	....	45.00	....	42.00	42.00	....	....	....
June 18	....	....	73.00	....	....	....	....	....	....	....	....	....
June 4	....	....	....	....	62.00	....	....	....	....	....	....	....
Feb. 12	....	69.00	....	....	....	....	....	....	....	....	....	....
1937												
Apr. 10	....	....	....	....	....	....	....	....	....	....	....	107.00**
Mar. 13	....	....	....	....	....	....	58.00	....	....	....	....	....
Mar. 6	48.00	71.00	76.00	48.00	64.00	49.00	57.00	45.00	45.00	58.00	55.00	....
Feb. 27	....	....	....	....	....	....	....	....	....	....	50.00	....
Jan. 1††	43.00	65.00	68.00	43.00	57.00	44.00	51.00	41.00	41.00	52.00	45.00	97.00

* Date on which Office of Price Administration issued price schedule No. 6, freezing steel prices at levels which prevailed during the first quarter of 1941. † Prices authorized by OPA on March 1, 1946, retroactive to Feb. 15, 1946. Tin plate price of $105 was authorized, but no business was booked at that level due to sellers' contract commitments. ‡ Base changed from 24 gage to 10 gage. § Succeeded No. 10 blue annealed, June 24, 1938. ** Refund of 25 cents per base box made on all contracts Jan. 1 to Nov. 10, 1938. †† Prices in effect on Jan. 1, 1937.

Finished Steel Annual Price Averages, 1927-47

(Per net ton, Pittsburgh)

	Sheets H.R.	Sheets C.R.	Sheets Gal.	Strip H.R.	Strip C.R.	Bars H.R.	Bars C.F.	Plates	Shapes	Basic Wire	Standard Nails	Tin Plate
1947	$52.60	$67.03	$74.05	$52.60	$67.03	$54.60	$67.03	$55.53	$52.53	$70.67	$84.44	$116.00
1946	48.03	64.80	79.50	47.33	60.56	49.46	61.21	49.38	46.38	60.25	69.61	104.38
1945	43.92	61.00	73.50	42.00	56.00	44.25	53.83	44.50	42.00	53.83	57.08	100.00
1944	42.00	61.00	70.00	42.00	56.00	43.00	53.00	42.00	42.00	52.00	51.00	100.00
1943	42.00	61.00	70.00	42.00	56.00	43.00	53.00	42.00	42.00	52.00	51.00	100.00
1942	42.00	61.00	70.00	42.00	56.00	43.00	53.00	42.00	42.00	52.00	51.00	100.00
1941	42.00	61.00	70.00	42.00	56.00	43.00	53.00	42.00	42.00	52.00	51.00	100.00
1940	41.80	60.80	70.00	41.75	55.75	43.00	53.00	42.00	42.00	52.00	51.00	100.00
1939	41.25	62.08	70.00	41.25	57.08	43.75	53.33	42.00	42.00	52.00	49.17	100.00
1938	45.42	66.67	72.92	45.25	61.08	47.00	56.00	43.50	43.50	55.00	52.00	106.00
1937	47.08	69.92	74.50	47.08	62.75	48.08	56.75	44.25	44.25	56.92	53.25	104.33
1936	38.25	60.00	63.25	38.25	52.33	38.50	44.42	37.00	37.00	48.17	42.83	105.00
1935	37.00	59.00	62.00	37.00	52.00	36.33	40.00	36.00	36.00	46.00	50.58	105.00
1934	37.08	58.75	61.25	37.17	51.75	36.17	42.00	35.67	35.67	45.42	50.58	105.00
1933	33.17	51.83	54.92	31.83	42.17	32.75	36.08	32.17	32.50	42.25	39.92	88.67
1932	34.08	55.17	56.33	28.92	39.75	31.67	35.75	31.67	31.67	44.00	39.00	93.75
1931	37.25	62.83	57.58	30.58	43.33	32.50	41.67	32.33	32.08	44.00	37.75	98.75
1930	40.17	73.00	63.00	33.67	49.33	34.42	41.83	34.17	34.17	46.67	42.50	103.75
1929	43.33	81.58	71.33	37.75	55.33	38.50	45.25	38.56	38.58	49.42	51.58	107.00
1928	40.75	80.67	71.75	36.92	56.83	37.50	44.00	37.50	37.50	49.00	51.58	105.25
1927	44.08	83.83	75.17	41.67	61.25	36.75	45.67	36.42	36.67	48.25	51.00	108.83

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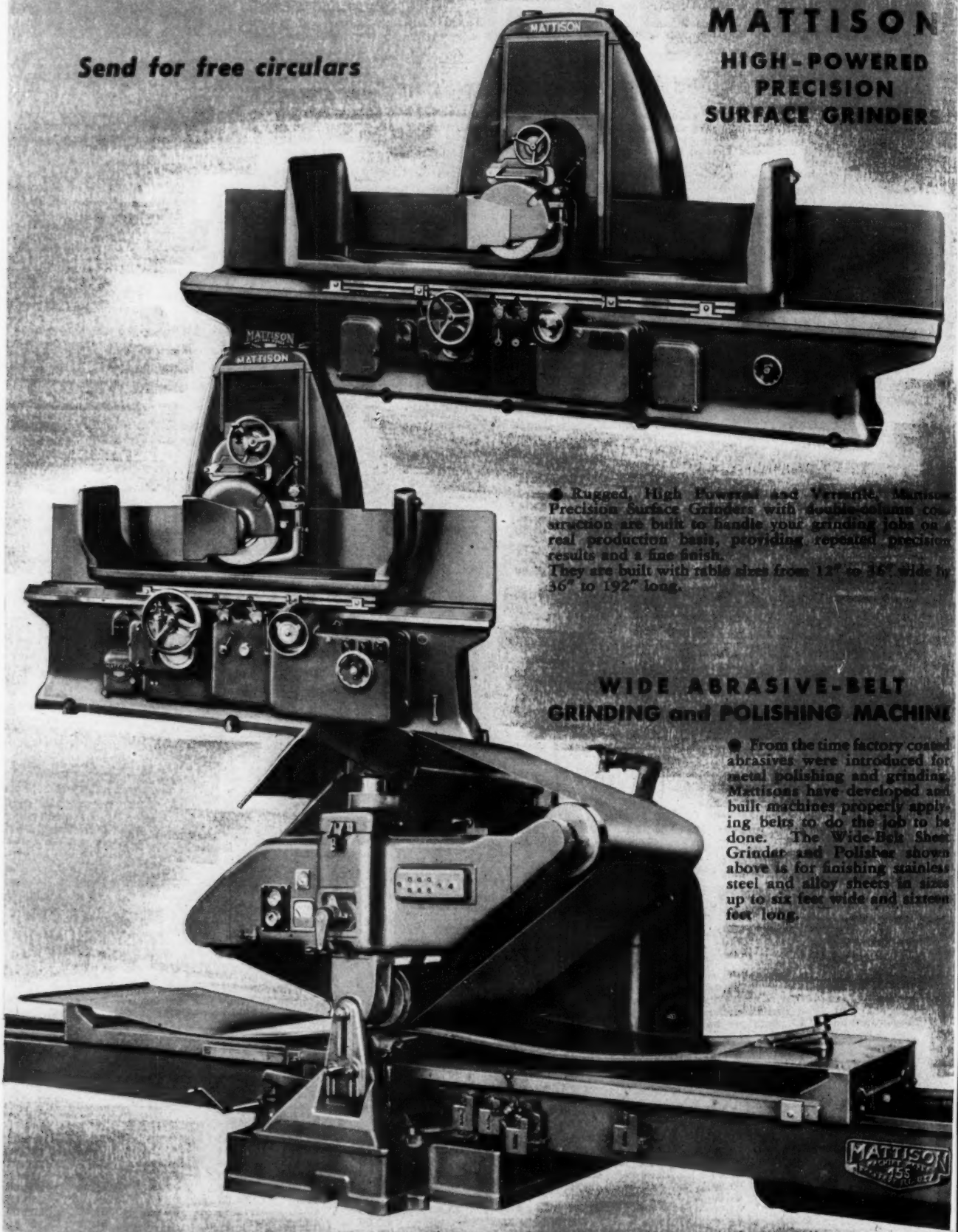

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Market Summary

STEEL ALLOCATION—The new year opens on an apprehensive note in the iron and steel markets. Although first quarter tonnage quotas have been set up, consumers are anxiously awaiting decisions to be made in Washington with respect to establishment of voluntary allocations under the anti-inflation law passed in the dying hours of the special session of Congress.

Most observers think the present pattern of distribution will not be greatly disturbed. However, many consumers are apprehensive that even minor modification may adversely affect their steel supplies. Consequently, they want to have their say in any decisions that may be made, and they are deluging government officials with letters emphasizing the importance and essentiality of their industries with a view to gaining recognition in any allocation scheme.

CONFERENCE—Steel executives meet with Commerce Department officials Jan. 8 to develop an allocations program. This meeting, it is understood, will be chiefly organizational in character, there being no intention to attempt actual allocation pending development of a definite program. This will take some time. Furthermore, in view of a disposition in government circles to refrain from allocations as far as possible, it seems likely that, immediately at least, the program will be confined to a few so-called essential industries. Just how, and who, will determine these essential industries, of course, is of major concern to all lines of steel consumption.

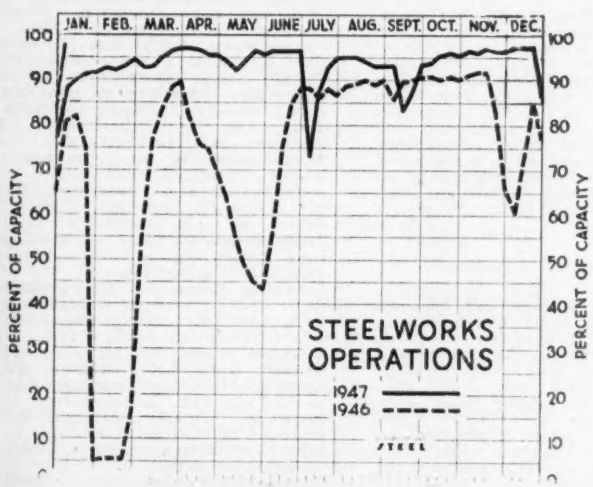
PRICES SHOW STRENGTH—Inflationary influences continue to force prices upward in the iron and steel and related markets. Last week the situation was featured by increases on pig iron, and an advance on by-product coke in the East. Pig iron was upped $2 per ton across the board by several producers in the North, while one Southern interest raised its prices $3 per ton. Last week higher contract prices on a number of ferroalloys went into effect. Finished steel prices are unchanged but stability is jeopardized by the continued rise in raw material costs and threat of another round of wage increases.

DEMAND PRESSING—Steelmakers entered the new year with substantial carryover tonnage in the major products. Plate producers will require at least a month to get caught up on arrearages, and sheet and strip sellers even longer. Hot carbon bar buyers report further tightening in supply, and cold-drawn bars are in less free supply than a few weeks back.

Sheet consumers are pressing with increased vigor for tonnage, reflecting fears that voluntary allocations may cut down first quarter shipment quotas.

SCRAP UNTESTED—The impasse in the scrap market continues. However, price test is expected within the next week or so, the view being widespread that steelmakers will have difficulty resisting higher levels. For the moment, quoted prices on steelmaking grades are largely nominal with only small open-market purchases being made. Considerable scrap is moving to the mills direct from customers thus circumventing normal scrap market channels. At the moment prices are extremely strong on the foundry grades, further advances being scored the past week.

OPERATIONS—Steelmaking operations recovered rapidly last week from the Christmas holiday curtailments, rising 11 points to 97 per cent of capacity which represents tonnage close to the peacetime high. Observance of the New Year holiday had no apparent effect on production schedules at blast furnaces and open-hearths, but some finishing and fabricating mills suspended operations for varying periods in order to replenish stocks of raw materials.



DISTRICT STEEL RATES

Percentage of Ingot Capacity engaged in Leading Districts

	Week Ended Jan. 3	Change	Same Week 1947	Same Week 1946
Pittsburgh	102	+16	96	76
Chicago	94	+14.5	88.5	87
Eastern Pa.	92	+ 7	78	73
Youngstown	92	+21	78	83
Wheeling	90.5	— 3	86	95
Cleveland	91	+10	87	84
Buffalo	87.5	— 1	90.5	81
Birmingham	99	None	99	85
New England	83	+ 8	89	80
Cincinnati	89	+11	82	72
St. Louis	89.5	None	68	68
Detroit	92	None	95	81
Estimated national rate	97	+11	88.5	81

Based on weekly steelmaking capacity of 1,749,928 net tons for 1947-48; 1,762,381 net tons for 1946.

COMPOSITE MARKET AVERAGES

Arithmetical Price Composites*

	Jan. 3	Dec. 27	Month Ago Dec.1947	Year Ago Jan. 1947	5 Years Ago Jan. 1943
Finished Steel	$78.05	$76.32	$76.15	$69.59	$56.73
Semifinished Steel	57.20	57.20	57.20	49.98	36.00
Steelmaking Pig Iron	36.56	36.31	36.31	29.56	23.00
Steelmaking Scrap	39.92	39.92	40.13	31.20	19.17

FINISHED STEEL WEIGHTED COMPOSITE†

Oct. 1947	3.45536c
Sept. 1947	3.45716c
Oct. 1946	2.86140c
Oct. 1942	2.37058c

* Straight Arithmetical Composites: Computed from average industry-wide base prices on Finished Carbon Steel (hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate, standard and line pipe), on Semifinished Carbon Steel (rerolling billets and slabs, sheet bars, skelp, and wire rods), on Basic Pig Iron (at eight leading basing points), and on Steelworks Scrap (No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania). Finished Steel arithmetical composite, dollars per net ton on net ton basis; others, gross ton.

† Finished Steel Weighted Composite: Computed in cents per pound, weighted on basis of actual monthly shipments of following products, representing 81 per cent of total steel shipments in the latest month for which statistics are available, as reported by American Iron & Steel Institute: Heavy structural shapes, plates, standard rails; hot-rolled carbon bars; black butt weld pipe and tubes; black lap weld pipe and tubes; black electric weld pipe and tubes; black seamless pipe and tubes; drawn wire; nails and staples; tin and terne plate; hot-rolled sheets; cold-rolled sheets; galvanized sheets; hot-rolled strip; and cold-rolled strip.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished material (except tin plate) and wire rods, cents per lb; coke, dollars per net ton; others, dollars per gross ton.

Finished Materials

	Jan. 3, 1948	Dec., 1947	Oct., 1947	Jan., 1947
Steel bars, Pittsburgh	2.90c	2.90c	2.90c	2.60c
Steel bars, del. Philadelphia	3.318	3.318	3.30	2.975
Steel bars, Chicago	2.90	2.90	2.90	2.60
Shapes, Pittsburgh	2.80	2.80	2.80	2.46
Shapes, del. Philadelphia	2.954	2.954	2.947	2.60
Shapes, Chicago	2.80	2.80	2.80	2.47
Plates, Pittsburgh	2.95	2.95	2.95	2.61
Plates, del. Philadelphia	3.17	3.17	3.16	2.77
Plates, Chicago	2.95	2.95	2.95	2.62
Sheets, hot-rolled, Pittsburgh	2.80	2.80	2.80	2.50
Sheets, cold-rolled, Pittsburgh	3.55	3.55	3.55	3.20
Sheets, No. 10 galv., Pittsburgh	3.90	3.90	3.90	3.55
Sheets, hot-rolled, Gary	2.80	2.80	2.80	2.50
Sheets, cold-rolled, Gary	3.55	3.55	3.55	3.20
Sheets, No. 10 galv., Gary	3.90	3.90	3.90	3.55
Strip, hot-rolled, Pittsburgh	2.80	2.80	2.80	2.50
Strip, cold-rolled, Pittsburgh	3.55	3.55	3.55	3.20
Bright basic, bess. wire, Pittsburgh	3.675	3.675	3.675	3.425
Wire nails, Pittsburgh	4.625	4.625	4.25	4.062
Tin plate, per base box, Pittsburgh	$6.70	$5.75	$5.75	$5.75

Semifinished Materials

Sheet bars, Pittsburgh, Chicago	$60.00	$60.00	$60.00	$47.60
Slabs, Pittsburgh, Chicago	47.50	47.50	47.50	41.40
Rerolling billets, Pittsburgh	47.50	47.50	47.50	41.40
Wire rod 7/32 to ¼-inch, Pitts.	3.05c	3.05c	2.925c	2.55c

Pig Iron

	Jan. 3, 1948	Dec., 1947	Oct., 1947	Jan., 1947
Bessemer, del. Pittsburgh (N.&S. sides)	$37.913	$37.913	$37.879	$31.815
Basic, Valley	36.00	36.00	36.00	30.00
Basic, eastern del. Philadelphia	38.84	38.84	38.78	31.99
No. 2 fdry., del. Pgh. (N.&S. sides)	37.41	37.413	37.379	31.315
No. 2 fdry., del. Philadelphia	39.34	39.34	39.28	32.49
No. 2 foundry, Chicago	38.00	36.00	36.00	30.50
No. 2 foundry, Valley	36.50	36.50	36.50	30.50
Southern No. 2, Birmingham	34.88	34.88	34.88	26.88
Southern, No. 2, del. Cincinnati	38.74	38.74	38.544	31.75
Malleable, Valley	36.50	36.50	36.50	30.50
Malleable, Chicago	38.50	36.50	36.50	30.50
Charcoal, low phos., fob Lyles, Tenn.	50.00	50.00	46.40	37.50
Ferromanganese, fob cars, Pittsburgh	151.00	151.00	151.00	140.00

Scrap

Heavy melt. steel, No. 1, Pittsburgh	$40.00	$40.00	$39.90	$32.50
Heavy melt. steel, No. 2, E. Pa.	41.00	41.625	39.50	31.00
Heavy melt. steel, No. 1, Chicago	38.75	38.75	39.55	30.00
Heavy melt. steel, No. 1, Valley	39.75	39.75	39.50	32.50
Heavy melt. steel, No. 1, Cleveland	39.25	39.25	38.25	31.88
Heavy melt. steel, No. 1, Buffalo	42.50	42.50	39.00	30.88
Rails for rerolling, Chicago	59.00	58.625	51.00	36.25
No. 1 cast, Chicago	55.50	55.875	46.40	41.50

Coke

Connellsville, beehive furnace	$12.50	$12.25	$12.15	$8.81
Connellsville, beehive foundry	14.50	14.50	14.50	9.81
Chicago, oven foundry, del.	18.60	18.60	18.52	15.95

FINISHED AND SEMIFINISHED IRON, STEEL PRODUCTS

Finished steel quoted in cents per pound and semifinished in dollars per gross ton, except as otherwise noted. Prices apply on an individual producer basis to products within the range of sizes, grades, finishes and specifications produced at its plants. Delivered prices do not include the 3 per cent federal tax on freight.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, open market, $80-$85. Forging quality $46, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, $56.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, $45-$50, sales by smaller interests on negotiated basis at $65 or higher.

Forging Quality Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, $55-$58; Detroit, del., $61; eastern Mich., $62.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $66, del. Detroit $69, eastern Mich., $70.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Youngstown, $60; sales in open market $66 to $92.

Skelp: Pittsburgh, Youngstown, 2.60c-2.65c per lb.

Tube Rounds: Pittsburgh, Chicago, Gary, Cleveland, $69-70.

Wire Rods: Pittsburgh, Chicago, Birmingham, 7/32 to ¼-in., inclusive, $2.80-3.30 per 100 lb. 7/32 to 41/64-in., inclusive, $2.75, Cleveland; Galveston, $2.95; Worcester, $2.90-2.95. San Francisco (base del.), $3.52.

Bars

Hot-Rolled Carbon Bars (O.H. only) and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham, base, 20 tons one size, 2.90c; Detroit, del., 3.05c; eastern Mich., 3.10c; New York, del., 3.351c; Phila., del., 3.318c; San Francisco (base, del.), 3.63-3.95c; Los Angeles (base, del.), 3.625-3.86c; Seattle, 3.85c, base.

Rail Steel Bars: Same basing points as merchant carbon bars, except base is 10 tons. Prices upon application.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 3.30c; Detroit, del., 3.45c; eastern Mich., 3.50c. (Texas Steel Co. uses Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lb., 3.55c; Detroit, del., 3.70c; Toledo, 3.75c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Canton, base, 4.10c; Detroit, del., 4.25c; eastern Mich., 4.30c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.75c; San Francisco (base, del.), 3.33c; Los Angeles (base del.), 3.325c; Seattle, 3.88c, base.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo. Prices upon application.

Iron Bars: Single refined, Pittsburgh 7.15c-†7.70c, double refined 8.00-†9.75c; Pittsburgh, staybolt, 8.85c-†11.25c.

†Hand puddled.

Sheets

Hot-Rolled Sheets (18 gage and heavier): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Ashland, Ky., base, 2.80c; Granite City, 3.175c; Detroit, del., 2.95c; eastern Mich., del., 3.00c; Philadelphia, del., 3.02c; New York, del., 3.12c; Los Angeles (base, del.), 3.54c; San Francisco, (base, del.), 3.545c. (Andrews Steel Co. quotes Middletown, O., base for shipment to Detroit. Alan Wood Steel Co., Conshohocken, Pa., quotes 3.40c, Sparrows Point equivalent).

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.55c; Granite City, 3.65c; Detroit, del., 3.70c; eastern Mich., del., 3.75c; New York del., 4.001c; Philadelphia, del., 3.968c.

Galvanized Sheets, No. 10: (Based on 5 cent zinc) Pittsburgh, Chicago, Gary, Birmingham, 3.85c-3.95c; Youngstown, Sparrows Point, Canton, Middletown, base, 3.95c; Granite City, 4.05c; New York, del., 4.27c; Philadelphia, del., 4.17c; Los Angeles (base, del.), 4.62c; San Francisco (base, del.), 4.625c.

Corrugated Galvanized Sheets, No. 10: (Based on 5 cent zinc) Pittsburgh, Chicago, Gary, Birhingham base, 3.95c-4.05c.

Culvert Sheets, No. 16 flat: (Based on 5 cent zinc; corrugated 10 cents extra) Pittsburgh, Chicago, Gary, Birmingham: Copper alloy, 4.45c-4.55c; copper-iron or pure iron, 4.80c-4.90c. Granite City 4.65c and 5.00c, respectively. Los Angeles (base, del.), 5.24c; San Francisco (base, del.), 5.245c.

Aluminized Sheets: Hot-dipped, coils or cut lengths: Pittsburgh, 7.50c.

Stainless-Clad 20%: Pittsburgh, Washington, Coatesville, Pa., No. 304, 22.00c; No. 410, 20.00c; No. 430, 20.50c; No. 446, 27.00c. Prices include annealing and pickling.

Long Ternes, No. 10: Pittsburgh, Chicago, Gary, base, 3.85c-4.05c.

Enameling Sheets, No. 12: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 3.90c-3.95c; Granite City, 4.05c; Detroit, del., 4.10c; eastern Mich., 4.15c.

Electrical Sheets, No. 24: Field: Pittsburgh, Chicago, Gary, 4.50c; Kokomo, Ind., 4.60c. Armature: Pittsburgh, Chicago, Gary, 4.80c; Granite City, Ill., Kokomo, Ind., 4.90c. Electrical: Pittsburgh, Chicago, Gary, 5.30c; Granite City, Kokomo, 5.40c. Motor: Pittsburgh, Chicago, Gary, 6.05c; Granite City, 6.15c. Dynamo: Pittsburgh, 6.75c; Granite City, 6.85c. Transformer 72, 7.25c; 65, 7.95c; 58, 8.65c; 52, 9.45c, Pittsburgh.

Strip

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Birmingham, Youngstown, base, 2.80c; Detroit, del., 2.95c; eastern Mich., del., 3.00c; San Francisco (base, del.), 3.605c; Los Angeles (base, del.), 3.60c.

Cold-Rolled Strip: 0.25 carbon and less: Pittsburgh, Cleveland, Youngstown, 3.55c; Chicago, base, 3.65c, Detroit, del. 3.70c; eastern Mich., 3.75c; Worcester, base, 3.75c-4.10c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland base: 0.26-0.40 carbon, 3.55c; over 0.40 to 0.60 carbon, 5.05c; over 0.60 to 0.80, 5.65c; over 0.80 to 1.05, 7.15c; over 1.05 to 1.35, 9.45c; add 0.20c for Worcester.

Tin, Terne, Plate

Tin Plate: Pittsburgh, Chicago, Gary, Warren, O., per base box of 100 lb, 1.25 lb coating $6.60, 1.50 lb coating $6.80; Granite City, Birmingham, Sparrows Point, 1.25 lb coating $6.70, 1.50 lb coating $6.90.

Electrolytic Tin Plate: Pittsburgh, Gary, Warren, O., per base box of 100 lb, 0.25 lb tin, $5.80; 0.50 lb tin, $6.00; 0.75 lb tin $6.20; Granite City, Birmingham, Sparrows Point, $5.90, $6.10, $6.30, respectively.

Holloware Enameling Black Plate: Pittsburgh, Chicago, Gary, Warren, O., base 29-gage, 4.75c per lb; Granite City, Birmingham, Sparrows Point, 4.85c per lb.

Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, per base box of 100 lb, $5.90; Granite City, Birmingham, Sparrows Point, $6.00.

Roofing Ternes: Pittsburgh, per package 112 sheets; 20 x 28 in., coating I.C. 8-lb $15.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, 2.95c; Coatesville, Claymont, 3.40c; Geneva, Utah, (Base, del.), 3.125c; New York, del. 3.27c; Phila., del., 3.17c; Boston, del., 3.423c; St. Louis, del. 3.269c; San Francisco and Los Angeles, del., 3.67c for sizes and grades produced at Geneva, 3.76c for sizes and grades produced at Fontana, Calif. (Central Iron & Steel Co., Harrisburg, Pa. 4.45c, basing points.)

Floor Plates: Pittsburgh, Chicago, 4.20c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, 3.80c-4.137c; Coatesville, 4.50c.

Clad Steel Plates: Coatesville, 10% cladding: Nickel clad, 21.50c; inconel-clad, 30.00c; monel-clad, 24.00c. Pittsburgh, Washington, Coatesville, Pa., 20% stainless-clad, base prices including annealing and pickling: No. 304, 24.00c; No. 410, 22.00c; No. 430, 22.50c; No. 443, 29.00c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.80c; New York, del., 3.02c; Phila., del., 2.954c; Geneva, Utah (base, del.), 2.975c; Los Angeles (base, del.), 3.41c-3.47c for sizes produced at Torrance, Calif., beyond sizes at Geneva; Los Angeles and San Francisco, del., 3.52c for sizes produced at Geneva; San Francisco, del., 3.41c for sizes produced at Fontana, Calif.

Alloy Structural Shapes: Pittsburgh, Chicago, 3.55c.

Steel Piling: Pittsburgh, Chicago, Buffalo, $3.30 per 100 lb.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham per 100 pounds).

Wire to Manufacturers in carloads

Bright, basic or bessemer.....**$3.55-3.80
Spring (except Birmingham)..... †$4.60

Wire Products to Trade

Nails

Standard and cement-coated.....‡$4.25-5.00
Galvanized .....‡$4.00-4.75
Staples, polished and galvanized....$4.25-5.00

Wire, Merchant Quality

Annealed (6 to 8 base) ..... ††$4.20
Galvanized (6 to 8 base) ..... ††$4.65

(Fob Pittsburgh, Chicago, Birmingham, per base column)

Woven fence, 15 gage and heavier....‡‡91-101
Barbed wire, 80-rod spool..... ‡‡101
Barbless wire, twisted 101
Fence Posts (no clamps) ..... ‡‡90
Bale ties, single loop..... ‡‡91

** Worcester, $3.65, Duluth, $3.60, base, San Francisco (base, del.), $4.56, bright basic only.

† Worcester $4.70, Duluth and Trenton, N. J., $4.85, base. San Francisco (base, del.) $5.63 for MB spring wire; $5.28 black premier.

‡ Worcester $4.55, Cleveland $4.35, base. San Francisco (base, del.) $5.33.

§ Duluth $4.00, Cleveland $4.10, base. San Francisco (base, del.) $5.08.

†† Worcester $4.30, annealed; $4.75, galvanized. Duluth $4.20, annealed; $4.65, galvanized. San Francisco (base, del.) $5.21, annealed; $5.66 galvanized.

‡‡ San Francisco (base, del.): Woven fence, 114; barbed wire, 121; bale ties, 115. Duluth (base): Woven fence, 91; barbed wire, 101; fence posts 90.

Rails, Supplies

Rails: Standard, over 60-lb fob mill, $2.75 per 100 lb. Light rails (billet), Pittsburgh, Birmingham, $3.10 per 100 lb; light rails (rail steel), Williamsport, Pa., Pittsburgh prices upon application.

Relaying, 60 lb and over fob warehouse $55-$56 per net ton.

Supplies: Track bolts, 7.00c; heat treated, 7.25c. Tie plates, $3.05 per 100 lb, fob mill; $3.40 base, Seattle; $3.20, base, Pittsburg, Calif. Splice bars, $3.25 per 100 lb, fob mill. Standard spikes, 4.85c; screw spikes, 6.75c. Axles, 4.10c.

Tubular Goods

Standard Steel Pipe: Base price in carlots, threaded and coupled, to consumers about $200 a net ton. Base discounts Pittsburgh on all types; Lorain on steel butt weld, and seamless; Gary, Ind., 2 points less on steel lap weld and 1 point less on steel butt weld on sizes produced in that district.

	Butt Weld			Butt Weld	
In.	Blk.	Gal.	In.	Blk.	Gal.
⅛	46	19½	1	56	41½
¼	47	25	1¼	56½	42
⅜	44	22	1½	57	42½
½	50½	34½	2	57½	43
¾	53½	38½	2½ & 3..	58	43½

	Lap Weld		Elec. Weld		Seamless	
In.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
2 ...	49	34	48½	33½	48	33
2½-3.	52	37	51½	36½	51	36
3½-6.	54	39	53½	38½	53	38

Line Steel Pipe: Base price in carlots to consumers about $200 a net ton. Base discounts Pittsburgh and Lorain, O.

In.	Butt Weld	In.	Butt Weld
⅛	45	1	55
¼	46	1¼	55½
⅜	43	1½	56
½	49½	2	56½
¾	52½	2½ & 3	57

In.	Lap Weld	Elec. Weld	Seamless
2	48	47½	47
2½ & 3	51	50½	50
3½-6	53	52½	52
8	53½	53	52½
10	53	52½	52
12	52	51½	51

Boiler Tubes: Net base prices per 100 ft, fob Pittsburgh, in carload lots, minimum wall thickness, cut lengths 4 to 24 feet, inclusive.

		——Seamless——		—Elec. Weld—	
O.D.		Hot	Cold	Hot	Cold
Sizes	B.W.G.	Rolled	Drawn	Rolled	Drawn
1"	13	....	$11.87	$11.51	$11.51
1¼"...	13	....	14.06	11.48	13.64
1½"...	13	$13.08	15.69	12.69	15.22
1¾"...	13	14.88	17.85	14.43	17.31
2"	13	16.67	19.99	16.17	19.39
2¼"...	13	18.58	22.29	18.02	21.62
2½"...	12	20.47	24.54	19.86	23.80
2¾"...	12	22.42	26.87	21.75	26.06
3"...	12	23.76	28.48	23.05	27.63
3"	12	24.93	29.90	24.18	29.00
3¼"...	11	29.03	34.81	28.16	33.77
3½"...	11	31.17	37.39	30.23	36.27
4"	10	38.69	46.38	37.53	44.99
4½"...	9	51.28	61.50	....	....
5"	9	59.39	71.18	....	....
6"	7	91.13	109.27	....	....

Pipe Cast Iron: Class B, 6-in. and over $74.50 per net ton, Birmingham; $79.50, Burlington, N. J.; $86.12, del. Chicago; 4-in. pipe, $5 higher; class A pipe, $5 a ton over Class B.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago; add 15c per cwt, Lebanon, Pa. Additional discounts: 5 for carloads; 15 for full containers, except tire, step and plow bolts.

Carriage and Machine Bolts

½-in. and smaller; up to 6 in. in length	45 off
⅝ and ¾ x 6-in. and shorter.....	46 off
¾-in. and larger x 6-in. and shorter...	43 off
All diameters longer than 6-in.	41 off
Tire bolts	35 off
Step bolts	43 off
Plow bolts	54 off
Lag bolts	
All diameters 6 in. and shorter	46 off
All diameters longer than 6 in.	44 off

Stove Bolts

In packages, nuts separate, 65-10 off; bulk 75 off on 15,000 of 3-in. and shorter, or 5000 over 3-in., nuts separate.

Nuts

Semifinished hexagon	A.S. Light	A.S. Reg. and Heavy
⅞-in. and smaller.....	46 off	.....
½-in. and smaller.....	.....	44 off
½-in.-1-in.	44 off	.....
⅝-in.-1-in.	.....	43 off
1⅛-in.-1½-in.	42 off	41 off
1⅝-in. and larger.....	.....	35 off

Additional discount of 15 for full containers.

Hexagon Cap Screws

(Packaged)

Upset 1-in. smaller by 6-in. and shorter (1020 bright)	53 off
Upset (1035 heat treated)	
⅝ and smaller x 6 and shorter.....	48 off
¾, ⅞, & 1 x 6 and shorter.....	44 off

Square Head Set Screws

Upset 1-in. and smaller.....	57 off
Headless, ¼-in. and larger.....	40 off
No. 10 and smaller	52 off

Rivets

Fob Pittsburgh, Cleveland, Chicago, Birmingham

Structural ½-in. and larger	5.65c
Lebanon, Pa.	5.80c
⅞-in. and under	55 off
Lebanon, Pa. .....55 off plus 15c per cwt.	

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl ..... $1-$2 off

Tool Steels

Tool Steel: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 16.00-17.00c; extra carbon 20.00c; special carbon 24.00c; oil-hardening 26.00c; high carbon-chromium 47.00c.

W	Cr	V	Mo	Base, Per lb
18.00	4	1	...	82.00c
1.5	4	1	8.5	59.00c
12	3	0.50	...	67.00c
6.40	4.15	1.90	5	63.00c
5.50	4.50	4	4.50	80.00c

Stainless Steels

Base, Cents per lb

Grade	Bars, Drawn Wire, Structurals	Plate	Sheets	Hot Rolled Strip	Cold Rolled Strip
CHROMIUM NICKEL STEELS					
301....	26.00c	29.50c	37.00c	22.00c	28.00c
302....	26.00	29.50	37.00	23.50	30.50
303....	28.50	31.50	39.00	29.50	36.00
304....	27.50	31.50	39.00	25.50	32.50
308....	31.50	37.00	44.50	31.00	38.00
309....	39.00	43.50	51.00	40.50	51.00
310....	53.50	56.50	57.50	53.00	61.00
316....	43.50	48.00	52.00	43.50	52.00
321....	31.50	37.00	44.50	32.00	41.50
347....	36.00	41.50	49.00	36.00	45.50
431....	21.00	24.00	31.50	19.00	24.50
440A..	26.00	31.00	36.50	26.00	30.50
STRAIGHT CHROMIUM STEEL					
403....	23.50	27.00	32.00	23.00	29.50
410....	20.50	23.50	29.00	18.50	24.00
416....	21.00	24.00	29.50	20.00	25.50
420....	26.00	31.00	36.50	26.00	39.50
430....	21.00	24.00	31.50	19.00	24.50
430F ..	21.50	24.50	32.00	20.50	27.00
442....	24.50	28.00	35.50	26.00	35.00
443....	24.50	28.00	35.50	26.00	35.00
446....	30.00	33.00	39.50	38.00	56.50
†501...	9.00	13.00	17.50	13.00	18.50
†502...	10.00	14.50	18.50	14.50	19.50
‡STAINLESS CLAD STEEL (20%)					
304....	....	....	24.00	22.00	....	....
410....	....	....	22.00	20.00	....	....
430....	....	....	22.50	20.50	....	....
446....	....	....	29.00	27.00	....	....

† Low chromium. ‡ Fob Pittsburgh and Washington, Pa.; plate prices include annealing and pickling.

RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax.

Pig Iron

Per Gross Ton	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa., base	$37.00	$37.50	$38.00	$38.50
Newark, N. J., del.	39.02	39.52	40.02	40.52
Brooklyn, N. Y., del.	....	40.80	44.30	....
Philadelphia, del.	38.84	39.34	39.84	40.34
Birmingham, base	32.88†	33.38†	....	....
Baltimore, del.	....	40.42	....	....
Chicago, del.	....	36.72	....	....
Cincinnati, del.	....	38.74	....	....
Newark, N. J., del.	....	39.14	....	....
Philadelphia, del.	....	38.96	....	....
St. Louis, del.	....	37.77	....	....
Buffalo, base	36.00†	36.00†	36.50†	37.00
Boston, del.	43.128	43.128	46.63	44.13
Rochester, del.	38.02	38.02	38.52	39.02
Syracuse, del.	38.75	38.75	39.25	39.75
Canton, Massillon, O., base	35.50	36.00	36.50	....
Chicago, base	37.50	38.00	38.50	39.00
Milwaukee, del.	38.95	39.45	39.95	40.45
Muskegon, Mich., del.	....	42.21	42.71	....
Cleveland, fob furnace	35.50†	36.00†	36.50†	37.00
Akron, del.	37.34	37.84	38.34	38.84
Duluth, base	38.00	38.50	39.00	39.50
Erie, Pa., base	37.50	38.00	38.50	39.00
Everett, Mass., base	....	45.00	45.50	....
Granite City, Ill., base	36.50	37.00	....	....
St. Louis, del.	37.33	37.83	....	....
‡**Neville Island, Pa.,** base	36.00	36.50	36.50	37.00
Pittsburgh, del., N.&S. Sides	36.913	37.413	37.413	37.913
Provo, Utah, base	36.00	36.50	....	....
Seattle, Tacoma, Wash., del.	....	43.03	....	....
Portland, Oreg., del.	....	43.03	....	....
Sharpsville, Pa., base	36.00	36.50	36.50	37.00
Steelton, Pa., base	37.00	37.50	38.00	38.50
Struthers, O., base	36.50	37.00	37.00	37.50
Swedeland, Pa., base	45.00	45.50	46.00	46.50
Troy, N. Y., fob furnace	39.50	....	40.00	....
Toledo, O., base	37.50	38.00	38.50	39.00
Cincinnati, del.	41.35	41.85	....	....
Youngstown, O., base	36.00	36.50	36.50	37.00
Mansfield, O., del.	39.28	39.78	39.78	40.28

† Republic Steel Corp. quotes $3 a ton higher at Birmingham, effective Aug. 13, 1947; $4.00 higher for No. 2 foundry and malleable and $3.50 higher for basic at Buffalo, and $3.75 higher at Cleveland, effective on shipments during week ended Dec. 28.

‡ To Neville Island base add: 72.6c for McKees Rocks, Pa., $1.111 Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; $1.463 Oakmont, Verona; $1.639 Brackenridge.

Blast Furnace Silvery Pig Iron

6.00-6.50 per cent (base)	$45.50		
6.51-7.00	$46.75	9.01- 9.50	53.00
7.01-7.50	48.00	9.51-10.00	54.25
7.51-8.00	49.25	10.01-10.50	55.50
8.01-8.50	50.50	10.51-11.00	56.75
8.51-9.00	51.75	11.01-11.50	58.00

Fob Jackson, O., per gross ton; Buffalo base $3.25 higher. Buyer may use whichever base is more favorable.

Bessemer Ferrosilicon

Prices same as for blast furnace silvery iron, plus $1 per gross ton. **Electric Furnace Silvery Pig Iron:** Si 14.01-14.50%, $70.75, Jackson, O.; $73.75, Niagara Falls; $73, open-hearth and foundry grade, Keokuk, Iowa. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.5% Mn over 1%; $1 a ton for 0.045% max. phos.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn...$50.00 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $36.00

Low Phosphorus

Steelton, Pa., Buffalo, Troy, N. Y., $42.00. Philadelphia, $44.376, delivered. Intermediate phosphorus, Central furnace, Cleveland, $39.00.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge of 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge of 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Metallurgical Coke

Price per Net Ton

Beehive Ovens

Connellsville, furnace	$12.00-$13.00
Connellsville, foundry	14.00- 15.00
New River, foundry	12.50
Wise county, foundry	11.15
Wise county, furnace	10.65

Oven Foundry Coke

Kearney, N. J., ovens	$18.75
Chicago, outside del.	17.60
Chicago, del.	18.60
Terre Haute, del.	18.15
Milwaukee, ovens	18.25
New England, del.	19.60
Birmingham, del.	15.76
Indianapolis, ovens	17.00
Cincinnati, del.	18.10
Ironton, O., ovens	16.00
Erie, Pa., del.	18.35
Painesville, O., ovens	17.10
Cleveland, del.	18.50
Buffalo, del.	18.75
Detroit, del.	18.25
Philadelphia, ovens	17.75
Swedeland, Pa., ovens	17.75
Portsmouth, O., ovens	16.00
Fairmont, W. Va., ovens	16.25
Pittsburgh, del.	18.21

Coal Chemicals

Spot, cents per gallon

Pure and 90% benzol	19.00†
Toluol, two degrees	23.00
Industrial xylol	25.00
Solvent naphtha	25.00

Per pound fob works

Phenol (car lots, returnable drums)	12.00
Do., less than carlots	12.75
Do., tank cars	11.00

Eastern plants, per pound

Naphthalene flakes, balls, bbl, to jobbers, "household use"	11.00

Per ton, bulk, fob plants

Sulphate of ammonia	$35.00

†Freight allowed up to 2 cents.

Refractories

Per 1000, fob shipping point

Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky.	$87.00

High Heat Duty

Pa., Ill., Md., Mo., Ky.	70.00
Ala., Ga.	70.00
N. J.	75.00

Intermediate Heat Duty

Ohio	64.00
Pa., Ill., Md., Mo., Ky.	64.00
Ala., Ga.	56.00
N. J.	67.00

Low-Heat Duty

Pa., Md., Ohio	56.00

Ladle Brick

(Pa., O., Va., Mo.)

Dry Press	47.00
Wire Cut	45.00

Malleable Bung Brick

All bases	80.00

Silica Brick

Pennsylvania	70.00
Joliet, E. Chicago	79.00
Birmingham, Ala.	70.00

Basic Brick

Net tons, fob Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	59.00
Chem. bonded chrome	59.00
Magnesite brick	81.00
Chem. bonded magnesite	70.00

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.

Bulk	24.00
Single bags	28.00

Dolomite

Domestic, dead-burned, bulk, net ton, fob Billmeyer, Blue Bell or Williams, Pa., Millville, W. Va., Nario, Millersville, Martin, Gibsonburg or Woodville, O., $11.05; Midwest (fob Thornton or McCook, Ill.), add $0.10; Missouri Valley (fob Dolly Siding, and Bonne Terre, Mo.), add $0.20.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$5.95
Old range nonbessemer	5.80
Mesabi bessemer	5.70
Mesabi nonbessemer	5.55
High phosphorus	5.55

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56.62% contract	15.20

Foreign Ore

Cents per unit, cif Atlantic ports

No. African low phos.	Nom.
Swedish basic, 60 to 68%	13.50
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro, nom.	5.50-6.50

Tungsten Ore

Wolframite and scheelite per short ton unit, duty paid	$26-$28

Manganese Ore

48-50%, duty paid, fob cars, New York, Philadelphia, Baltimore, Norfolk, Va., Mobile, Ala., New Orleans, 65.00c-67.00c.

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., and/or Tacoma, Wash. (S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$37.50
48% 3:1	39.00
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	$25.50-$26.00
45% no ratio	26.50
48% no ratio	28.50
50% no ratio	29.50
Brazilian—nominal	
44% to 2.5:1 lump	$33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	$27-$27.50
48% no ratio	30.00
48% 3:1 lump	39.00
Domestic (seller's nearest rail)	
48% 3:1	$39.00

Molybdenum

Sulphide conc., lb., Mo. cont., Mines	$0.75

Fluorspar

Metallurgical grade, fob shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $35; less than 60% $32.

HIGH-STRENGTH—LOW-ALLOY STEELS

Prices in dollars per 100 pounds

	Pittsburgh	Chicago	Gary	Youngstown	Sparrows Point	Buffalo	Bethlehem	Canton	Massillon
Sheets, Hot-Rolled	4.30	4.30	4.30	4.30	4.30	4.30	...	...	...
Cold-Rolled	5.30	5.30	5.30	5.30	...	5.30	...	...	...
Galvanized	5.85	...	...	...	...	...	...	...	...
Strip, Hot-Rolled	4.30	4.30	4.30	4.30	...	...	...	...	...
Cold-Rolled	5.30	5.30†	5.30†	5.30	...	...	...	...	...
Shapes, structural	4.30	4.30	...	4.30	...	...	4.30	...	...
Plates	4.55	4.55	4.55	...	4.55	...	...	...	...
Bars, Small Shapes	4.45	4.45	4.45	4.45	...	4.45	...	4.45	4.45

†Nax High Tensile, produced by Great Lakes Steel Corp., quoted 10 cents higher.

WAREHOUSE STEEL PRICES

Prices, cents per pound, for delivery within switching limits, subject to extras.

	SHEETS					STRIP		BARS				PLATES	
	H-R 10G	C-R 10G	C-R 17G	Gal. *10G	Gal. *24G	†H-R	†C-R	H-R Rds. ⅜" to 3"	C-F Rds. ½"& up	H-R Alloy (**4140)	Structural Shapes	Carbon ⅜"-¾"	Floor ⅜" & Thicker
Boston (city)	4.96	6.03[4]	5.73[4]	6.16[4]	7.41[4]	5.04	6.73	4.95	5.63	7.22	4.82	5.11	6.79
New York (city)	4.91	6.12	5.82[8]	6.11	7.36	5.03	....	5.02	5.57	7.00[9]	4.75	5.06	6.76
New York (country)	4.76	5.97	5.67[8]	5.96	7.21	4.88	....	4.87	....	....	4.60	4.91	6.61
Philadelphia (city)	4.67	6.28	5.88	5.87	7.12	4.78	5.68	4.83	5.53	7.15[9]	4.55	4.82	6.31
Philadelphia (country)	4.57	6.18	5.78	....	....	4.68	5.58	4.73	....	....	4.45	4.72	6.21
Baltimore (city)	4.31†	5.91	5.61	5.71	6.96	4.76	....	4.81	5.51	....	4.68	4.76	6.26
Baltimore (country)	4.21†	5.81	5.51	5.50	6.75	4.66	....	4.71	....	....	4.58	4.66	6.16
Washington (city)	4.75	....	....	....	....	4.95	....	5.00	5.60[12]	....	4.90	4.95	6.60
Washington (country)	4.65	....	....	....	....	4.85	....	4.90	....	....	4.80	4.85	6.50
Norfolk, Va.	4.80	....	....	....	....	....	....	5.10	5.90	....	5.05	5.05	6.80
Memphis, Tenn. (city)	4.82[20]§§	5.87[20]†	....	6.37	....	5.02[20]	....	4.97[20]	5.87	....	4.97[20]	5.17[20]	6.87[20]
Memphis, Tenn. (country)	4.72[20]§§	5.77[20]†	....	6.27	....	4.92[20]	....	4.87[20]	5.77	....	4.87[20]	5.07[20]	6.77[20]
Buffalo (city)	4.45	....	5.20[5]	6.00	....	4.70	5.65	4.40	5.10	6.65	4.40	4.95	6.20
Buffalo (country)	4.30	....	5.05[5]	5.55	....	4.25	5.50	4.25	4.95	6.65	4.25	4.45	5.75
Pittsburgh (city)	4.25§§	....	5.10[8]†	5.65	6.90	4.35	5.35	4.40	5.10	6.85	4.40	4.60	5.90
Pittsburgh (country)	4.10§§	....	4.95[8]†	5.50	6.75	4.20	5.20	4.25	4.95	6.85	4.25	4.45	5.75
Cleveland (city)	4.45	5.50[8]	5.20[8]	5.78	7.03	4.52	5.35	4.40	5.10	6.85	4.65	4.60	6.15
Cleveland (country)	4.30	5.35[8]	5.05[8]	....	....	....	5.20	4.25	4.95	....	....	4.45	....
Cincinnati	4.671	5.516[8]	....	5.716	6.466	4.694	....	4.703	5.353	....	4.744	4.903	6.244
Detroit	4.55	....	5.30	....	....	4.72	5.63	4.50	5.22	7.10	4.77	4.88	6.28
Indianapolis	4.55	5.32[8]	....	5.87	7.12	4.65	5.90	4.70‡‡	5.40	8.85	4.70	4.90	6.35
Chicago (city)	4.45	5.50[8]	5.20[8]	5.65	6.90	4.35	5.45	4.40	5.10	6.65[9]	4.40	4.60	6.05
Chicago (country)	4.30	5.35[8]	5.05[8]	5.50	6.75	4.20	5.30	4.25	4.95	6.65[9]	4.25	4.45	5.90
Milwaukee	4.629	5.679[8]	5.379[8]	5.829	7.079	4.529	5.629	4.579	5.279	6.979[9]	4.579	4.779	6.229
St. Louis	4.78	5.83[9]	5.53[9]	6.02	7.27	4.68	5.82	4.73	5.47[12]	....	4.73	4.93	6.38
Birmingham (city)	4.45[20]§§	....	....	5.65	....	4.45[20]	....	4.40[20]	5.93[23]	....	4.40	4.65	6.86
Birmingham (country)	4.30[20]§§	....	....	5.50	....	4.30[20]	....	4.25[20]	....	....	4.25	4.50	....
New Orleans	4.98[30]**	....	6.29[18]	....	....	5.18[20]	....	5.13[20]††	6.29[11]	....	5.03[20]††	5.33[20]	7.29[20]
Omaha, Nebr.	5.365	....	....	6.565	7.815	5.265	....	5.315	6.015	....	5.315	5.515	6.965
Houston, Tex.	5.50	....	....	5.50	7.70	5.25	....	5.30	6.80[12]	7.70	5.85	5.35	6.50
Los Angeles (city)	5.75	7.75[8]	7.45[8]	7.40	8.80	6.05	8.70	5.50	7.35[23]	9.35[16]	5.35	5.55	7.65
Los Angeles (country)	5.60	7.60[8]	7.30[8]	7.25	8.65	5.90	8.55	5.35	7.20[1]	9.20[16]	5.20	5.40	7.50
San Francisco	5.20[21]	6.65[5]	....	6.85[5]	7.75[5]	5.75[21]	8.70[15]	5.05[21]	7.00[12]	9.35	5.20[21]	5.30[21]	7.10[21]
Seattle, Tacoma, Wash.	5.30[17]§§	....	7.10[8]‡	6.70	....	5.60[17]	....	5.45[17]	7.45[19]	8.50[12]	5.25[17]	5.45[17]	7.55[17]
Portland, Oreg.	5.30[17]§§	....	7.10[8]‡	6.70	....	5.60[17]	....	5.45[17]	7.45[19]	....	5.25[17]	5.45[17]	7.55[17]

Base Quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over, cold finished bars, 1000 lb and over; galvanized sheets, 450 to 1499 lb; [1]—1500 lb and over; [2]—1000 to 4999 lb; [4]—three to 24 bundles; [5]—450 to 1499 lb; [8]—400 to 1499 lb; [9]—1000 to 1999 lb; [12]—1000 to 39,999 lb; [15]—2000 lb and over; [17]—300 to 9999 lb; [18]—1500 to 1999 lb; [19]—1500 to 39,999 lb; [20]—400 to 3999 lb; [21]—400 lb and over; [23]—500 to 1499 lb.

† Includes gage and coating extra, except Birmingham (coating extra excluded); ‡does not include gage extras; §15 gage; **as rolled; ††add 0.40 for sizes not rolled in Birmingham; ‡‡ add 15c for 100 lb for slow moving items; §§18 gage and heavier.

PRICES OF LEADING FERROALLOYS PRODUCTS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $47, Palmerton, Pa., $51, Pittsburgh. 16% to 19% Mn., $46, Palmerton, $50, Pittsburgh.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.). Carload, lump, bulk $145 per gross ton of alloy, carload packed $157, ton lot $172, less ton $189; fob New Orleans, Mobile, Philadelphia, Baltimore, or New York. Carload, lump, bulk $151, fob cars Pittsburgh, including 50c switching charge. Add, or subtract, $1.80 for each 1%, or fraction thereof, of contained manganese over 82% or under 78%.

West Coast Prices: Carload (80,000 lb or more), lump, bulk, same price and basing points as above. All other prices for shipment from Pacific Coast warehouses, add $26.21 to above prices. Delivery is fob Portland, Los Angeles, South San Francisco, or Seattle warehouses, with railroad freight allowed on shipments of 25 gross tons or more.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Eastern Zone, carload, lump, bulk, max. 0.10% C, 22.5c per lb of contained Mn, carload packed 23.25c, ton lot 24.35c, less ton 25.55c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.7c for c.l. and 4.4c for l.c.l. Freight allowed. Deduct 0.5c for max 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 0.75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Eastern Zone, carload, lump, bulk 16.5c per lb of contained Mn, carload packed 17.25c, ton lot 18.35c, less ton 19.55c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.7c for c.l. and 4.4c for l.c.l. Freight allowed. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Eastern Zone, carload, 2" x D, bulk 32c per lb of metal, carload packed 32.5c, ton lot 34c, less ton 36c; Central, add 1c for c.l. and 1.45c for l.c.l.; Western, add 1.45c for c.l. and 2.4c for l.c.l. Freight allowed. Spot, add 2c.

Silicomanganese: (Mn 65-70%). Eastern Zone, contract, lump, bulk, 1.50% C grade, 17-20% Si, 7.8c per lb of alloy, carload packed, 8.5c, ton lot 9.45c, less ton 10.45c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5c for l.c.l. Freight allowed. For 2.0% C grade, Si 15-17%, deduct 0.2c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Eastern Zone, contract, c.l., lump, bulk 18.6c per lb of contained Cr, c.l., packed 19.5c, ton lot 20.65c, less ton 22.05c; Central, add 0.4c for c.l. and 1.3c for l.c.l.; Western, add 0.55c for c.l. and 2.1c for l.c.l. Freight allowed. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Eastern Zone, contract, c.l., 8MxD, bulk 20.1c per lb of contained Cr, c.l., packed 21.0c, ton lot 22.35c, less ton 24.1c; Central, add 0.4c for c.l. and 1.3c for l.c.l.; Western, add 0.55c for c.l. and 2.1c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Eastern Zone, contract, carload, lump, bulk, max. 0.03% C 28.5c per lb of contained Cr, 0.04% C 27.5c, 0.05% C 27.0c, 0.06% C 26.5c, 0.10% C 26.0c, 0.15% C 25.5c, 0.20% C 25.25c, 0.50% C 25.0c, 1% C 24.5c, 2% C 24.25c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c; Central, add 0.4c for c.l. and 0.65c for l.c.l.; Western, add 0.5c for c.l. and 1.85c for l.c.l. Freight allowed. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, add C 1.25% max.). Eastern Zone, contract, carload, lump, bulk 25c per lb of contained chromium, carload, packed 26.1c, ton lot 27.3c, less ton 29.1c; Central, add 0.4c for c.l. and 0.65c for l.c.l.; Western, add 0.5c for c.l. and 1.85c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 2c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 2c for each 0.25% of N above 0.75%.

Chromium Metal: (Min. 97% Cr and 1% Fe). Eastern Zone, contract, carload, 1" x D, packed, max. 0.50% C grade, 93c per lb of contained chromium, ton lot 94.5c, less ton 97c; Central, add 1.5c for c.l. and 2.5c for l.c.l.; Western, add 2.75c for c.l. and 4.5c for l.c.l. Freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 9.3c per lb of contained Si, carload packed 10.9c, ton lot 12.35c, less ton 14.0c; Central, add 0.5c for c.l. and 1.25c for l.c.l.; Western, add 0.7c for c.l. and 1.8c for l.c.l. Freight allowed. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.). Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 11.8c per lb of contained Si, carload packed 13.1c, ton lot 14.25c, less ton 15.5c; Central, add 0.3c for c.l. add 0.75c for l.c.l.; Western, add 1.05c for c.l. and 5c for l.c.l. Freight allowed. Spot, add 0.3c.

85% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 13.3c per lb of contained Si, carload packed 14.55c, ton lot 15.55c, less ton 16.7c; Central, add 0.3c for c.l. and 0.7c for l.c.l.; Western, add 1.05c for c.l. and 4.4c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk, 15c per lb of contained Si, carload packed 16.2c, ton lot 17.15c, less ton 18.2c; Central, add 0.3c for c.l. and 0.65c for l.c.l.; Western, add 1c for c.l. and 4c for l.c.l. Freight allowed. Spot, add 0.25c.

Low - Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Over 97% Si and 1% max. Fe). Eastern Zone, c.l., lump, bulk, regular, 17.3c per lb of Si, c.l. packed 18.5c, ton lot 19.4c, less ton 20.4c; Central, add 0.6c for c.l. and 2.25c for l.c.l.; Western, add 1.2c for c.l. and 4c for l.c.l. Add 1c for max. 0.20% calcium grade. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade, analyzing over 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract basis fob Niagara Falls, N. Y., lump per lb c.l. 6.90c; ton lots packed, 7.40c; 200 to 1999 lb, 8.15c; smaller lots, 8.65c. Spot up 0.5c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Eastern Zone, contract, carload, bulk, 12.5c per lb of briquet, carload packed 13.2c, ton lot 14.0c, less ton 14.9c; Central, add 0.25c for c.l. and 0.9c for l.c.l.; Western, add 0.35c for c.l. and 1.5c for l.c.l. Freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Eastern Zone, contract, carload, bulk, 8.7c per lb of briquet, c.l. packaged 9.5c, ton lot 10.3c, less ton 11.2c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5c for l.c.l. Freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Eastern Zone, contract, c.l., bulk 8.75c per lb of briquet, c.l. packed 9.55c, ton lot 10.35c, less ton 11.25c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5c for l.c.l. Freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Eastern Zone, contract, carload, bulk 5.1c per lb of briquet, c.l. packed 5.25c, ton lot 6.7c, less ton 7.6c. **(Small size**—weighing approx. 2½ lb and containing exactly 1 lb of Si). Eastern Zone, carload, bulk 5.25c, c.l. packed 6.05c, ton lot 6.85c, less ton 7.75c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.45c for c.l. and 0.9c for l.c.l. Freight allowed. Add 0.25c for notching, small size only. Spot, add 0.25c.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18%, and Si 53-59%). Eastern Zone, contract, carload, lump, bulk 17.50c per lb of alloy, carload packed 19.0c, ton lot 19.8c, less ton 20.8c; Central, add 0.5c for c.l. and 0.85c for l.c.l.; Western, add 2.55c for c.l. and 2.6c for l.c.l. Freight allowed. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Eastern Zone, contract, carload, lump, bulk 16 25c per lb of alloy, carload packed 16.45c, ton lot 19.35c, less ton 20.85c; Central, add 0.5c for c.l. and 0.75c for l.c.l.; Western, add 2.55c for c.l. and 2.90c for l.c.l. Freight allowed. Spot, add 0.25c.

VANADIUM ALLOYS

Ferrovanadium: Open Hearth Grade (Va 50-55%, Si 8% max., C 3% max.). Eastern Zone, contract, any quantity, $2.90 per lb of contained Va; Central, add 2c for c.l. and 3c for l.c.l.; Western, add 6c for c.l and 9c for l.c.l. Freight allowed. Spot, add 10c. **Special Grade** (Va 50-55%, Si 4% max., C 1% max.), $3. **High Speed Grade** (Va 50-55%, Si 1.50% max., C .20% max.), $3.10.

Vanadium Oxide: All Zones, contract, less carload lots, $1.20 per lb of contained V_2O_5. Spot, add 5c.

Grainal: Vanadium Grainal No. 1, 93c; No. 6, 63c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

TITANIUM ALLOYS

Ferrotitanium: (Ti 20-25%, Al 3% max., Si 4% max., C 0.10% max.). Eastern Zone, contract, ton lot, 2" x D, $1.35 per lb of contained Ti, less ton $1.40. (Ti 40-45%, Al 7% max., Si 4% max., C 0.10% max.). Ton lot $1.23, less ton $1.25; Central, add 4c for 20-25% Ti grade, and 2.1c for 40-45% grade; Western, add 13.5c for 20-25% Ti grade, and 7.2c for 40-45% grade. Freight allowed. Spot, add 5c.

Ferrotitanium, High-Carbon: (15-20%). Contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C, $142.50; 3-5% C, $157.50.

TUNGSTEN ALLOYS

Ferrotungsten: (W 70-80%). Eastern Zone, contract, 10,000 lb W or more, $2.25 per lb of contained W; 200 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot add 2c.

Tungsten Powder: (W 98.8% min.). Eastern Zone, contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Eastern Zone, contract, c.l., lump, bulk 6c per lb of alloy, c.l. packed 6.75c, ton lot 7.5c, less ton 8.35c; Central, add 0.25c for c.l. and 1.1c for l.c.l.; Western, add 0.6c for c.l. and 3.95c for l.c.l. Freight allowed. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Eastern Zone, contract, carload, lump, packed 18.4c per lb of alloy, ton lot 19.15c, less ton 20.4c; Central, add 0.6c for c.l. and 1.05c for l.c.l.; Western add 3.05c for c.l. and 4c for l.c.l. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Eastern Zone, contract, 100 lb or more. 1" x D, $1.20 per lb of alloy, freight allowed. Less than 100 lb $1.30; Central, add 0.75c; Western, add 2.9c, freight allowed. Spot add 5c.

Borosil: (3 to 4% B, 40 to 45% Si). $6.25 per lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Mn 5% max., Si 8% max., C 0.5% max.). Eastern Zone, contract, ton lot, 2" x D, $2.50 per lb of contained Cb, less ton $2.55; Central, add 1.65c; Western, add 6.45c. Freight allowed. Spot, add 10c.

CMSZ Mixes: No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Eastern Zone, carload, 12 M x D, carload packed 17.25c per lb of material, ton lot 18.00c, less ton 19.25c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l. and 3.05c for l.c.l. Freight allowed.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, Boron 0.55-0.75%). Eastern Zone, carload, packed, 1" x D, 39c per lb of alloy, ton lot 41c, less ton 43c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l. and 3.05c for l.c.l. Freight allowed.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Eastern Zone, contract, carload, packed, ½" x 12 M, 15.0c per lb of alloy, ton lot 15.75c, less ton 17.0c; Central add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l. and 3.05c for l.c.l. Freight allowed. Spot, add 0.25c.

Simanal: (Approx. 20% each Si, Mn, Al) Packed, lump, carload 9c, ton lots 9.25c, smaller lots 9.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Ferrophosphorus: 17-19% based on 18% P content with unitage of $3 for each 1% of P above or below the base) Gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferromolybdenum: (55-75%). Per lb, contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Holidays and Adverse Weather Cut Metal Sales

Limited supplies further limit sales in all major nonferrous markets

NEW YORK — Yearend holiday influences and adverse weather conditions in the East, coupled with limited supplies, reduced trading in nonferrous metals last week. Prices in leading markets held unchanged.

ALUMINUM — Production of primary aluminum in the United States increased about 39 per cent to approximately 1140 million pounds in 1947, Roy A. Hunt, president, Aluminum Co. of America, estimates.

"Despite the production records set in 1947," Mr. Hunt said, "the aluminum supply situation tightened toward the end of the year, particularly in certain mill products such as sheet. Demand for these mill products, over and above what would otherwise be the case, has been chiefly caused by shortages of other materials such as steel and galvanized iron. Alcoa's large new mill for rolling sheet and plate aluminum, now under construction at Davenport, Iowa, will come into production shortly, and will relieve the situation."

Despite the almost universal upsurge of prices for most other materials, the basic price of aluminum has decreased a full 30 per cent since 1939. This price reduction has been accomplished in the face of soaring costs, which saw wage rates increased approximately 75 per cent over those in effect at the beginning of World War II.

It is expected 1948 will be another good year for aluminum. All indications point toward a healthy growth in permanent aluminum markets, even after present-day shortages of other materials have been relieved, according to Mr. Hunt.

COPPER — The market was inactive last week with consumers generally postponing efforts to secure January metal until the first full week of the new year. Prices held unchanged at 21.50c, Connecticut, for electrolytic.

LEAD — Demand remained well in excess of lead supplies last week, although buying pressure lifted due to yearend considerations. Prices held unchanged on the basis of 14.80c to 14.85c, St. Louis.

Output of refined lead in Canada during November totaled 13,726 tons, compared with 14,139 tons in October, according to the American Bureau of Metal Statistics. This brought the total for the first 11 months of 1947 to 148,193 tons compared with 146,882 tons in the like 1946 period.

Stocks of lead at refineries at the end of November dropped to 24,809 tons from 28,370 tons at the end of October despite an increase in production to 51,481 tons from 50,248 in October, according to the American Bureau of Metal Statistics. Shipments remained at a high level in November, totaling 55,034 tons compared with 56,247 tons in the preceding month.

ZINC—Trading in the domestic zinc market closed the year on a strong price tone. Developments late in the year, including a sharp reduction in stocks, the government's stockpiling program and its low price level compared with that of lead, supported views of some interests that an upward adjustment in price may develop soon.

TIN — No new developments were reported in the tin market last week, prices holding unchanged at 94.00c, New York, for Straits.

NICKEL — As announced on Nov. 21, International Nickel Co. of Canada Ltd.'s price of refined nickel in the United States declined 1.25 cents a pound in line with a like reduction in the United States import duty on that metal, both being effective Jan. 1. "The encouraging outlook for business in the many industries which nickel serves indicates a continuance of the favorable showing made by the nickel industry in 1947," declared Robert C. Stanley, chairman and president of the company.

NONFERROUS METAL PRICES

Copper: Electrolytic, carloads 21.50c, delivered Conn.; Lake, 21.62½c del. Conn. Dealers may add ¾c for 5000 lb to carload; 1c 1000-4999 lb; 1½c, 500-999 lb; 2c 0-499 lb. Casting, nom., refinery, 20,000 lb or more; nom., less than 20,000 lb.

Brass Ingot: 85-5-5-5 (No. 115) 18.50-19.00c; 88-10-2 (No. 215) 28.50c; 80-10-10 (No. 305) 24.00c; No. 1 yellow (No. 405) 14.50-15.50c; carlot prices, including 25c per 100 lb freight allowance; add ¼c for less than carloads.

Zinc: Prime western 10.50c, brass special 10.75c, intermediate 11.00c, E. St. Louis; high grade 11.50c, del., carlots. For 20,000 lb to carlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 lb 0.4c; under 2000 lb 0.50c.

Lead: Common 14.80c-14.85c, chemical 14.90c, corroding 14.90c, E. St. Louis for carlots.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 15.50-16.00c; No. 12 foundry alloy (No. 2 grade) 15.25-15.75c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 15.50-16.00c; grade 2 (92-95%) 14.25-14.75c; grade 3 (90-92%) 14.00-14.50c; grade 4 (85-90%) 13.75-14.00c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-5000 lb; 1¼c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, about 20 lb), 10,000 lb and over, 20.50c, fob Freeport, Tex.; 2000 to 9999 lb, 21.50c; 100 to 1999 lb, 22.50c. Extruded rounds, 12 inches long, 1.312 inches in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 to 4000 lb, 35.00-36.00c.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lb, 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (including Straits), 94.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05% max. arsenic, 93.85c; Grade C, 99.65-99.79% incl. 93.50c; 99.00-99.64% 93.50c and 98.00-98.99%, 92.60c for tin content.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 33.00c; 99.8% and over (arsenic, 0.05% max.; other impurities, 0.1% max.) 33.50c, effective as of Mar. 15. On producers' sales add ¼c for less than carload to 10,000 lb; ½c for 224-999 lb; add 2c for 223 lb and less; on sales by dealers, distributors, and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked 33.75c lb; 25 lb pigs produced from electrolytic cathodes 35.25c lb; shot produced from electrolytic cathodes 36.25c lb; "F" nickel shots or ingots for addition to cast iron 34.25c lb. Prices include import duty.

Mercury: Open market, spot, New York, $79-$81 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $20.50 per lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms $1.75 lb, del.; anodes, balls, discs and all other special or patented shapes, $1.80.

Cobalt: 97-98%, $1.65 lb for 550 lb (keg) $1.67 lb for 100 lb (case); $1.72 lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Indium: 99.9%, $2.25 per troy ounce.

Silver: Open market, N. Y., 74.62½c, per ounce.

Platinum: $66-$69 per ounce.

Palladium: $24 per troy ounce.

Iridium: $80-$90 per troy ounce.

Rolled, Drawn, Extruded Products

Copper and brass product prices are fob mill, with freight prepaid on 200 lb or more.

Sheet: Copper 33.68c; yellow brass 29.63c; commercial bronze, 95% 33.72c, 90% 33.11c, red brass, 85% 31.99c, 80% 31.38c; best quality 30.64c; Everdur, Duronze, Herculoy or equiv., cold-drawn, 38.46c; nickel silver, 18%, 42.49c; phosphor bronze, grade A, 5%, 52.00c.

Rods: Copper, hot rolled 30.03c, cold drawn 31.03c; yellow brass, free cutting, 24.39c; commercial bronze, 95% 33.41c, 90% 32.80c; red brass, 85% 31.68c, 80% 31.07c; best quality 30.33c.

Seamless Tubing: Copper 33.72c; yellow brass 32.39c; commercial bronze 90% 35.52c; red brass 85% 34.65c, 80% 34.04c; best quality brass 33.05c.

Wire: Yellow brass 29.92c; commercial bronze, 95% 34.01c, 90% 33.40c; red brass, 85% 32.28c, 80% 31.67c; best quality brass 30.93c.

Copper Wire: Bare, soft, fob eastern mills, carlots 26.92c, less carlots 27.42c; weatherproof, fob eastern mills, carlots 27.60c, less carlots 28.10c; magnet, delivered, carlots 29.75c-31.13c, 15,000 lb or more 30.00c-31.38c, less carlots 30.50c-31.88c.

Aluminum Sheets and Circles: 2s and 3s flats, mill finish, base 30,000 lb or more, fob shipping point. Actual transportation charges (not to exceed lowest carload rail freight rate) are deducted on orders for domestic delivery of 500 lb or more of one product to one destination. Widths from 12 in. and diameters from 9 in. to indicated maximum sizes. Prices, cents per lb, effective Jan. 30, 1947.

B. & S. Gage	Max. Width or Diam.	Sheet Base	Circle Base
0.0249"-7	48"	23.70	26.20
8-10	48"	24.20	26.70
11-12	26"	24.70	27.50
13-14	26"	24.90	27.90
15-16	26"	25.10	28.20
17-18	26"	25.40	28.60
19-20	24"	25.70	29.00
21-22	24"	26.10	29.50
23-24	24"	26.60	30.20
25	24"	27.10	30.90
26	24"	27.80	31.90
27	24"	28.50	33.00
28	24"	29.20	33.70
29	24"	30.00	34.70
30	24"	30.80	35.80

Lead Products: Prices to jobbers: Sheets, full rolls, 140 sq ft or more, 18.25c; add per hundredweight, 25c, 80 to 140 sq ft; 50c, 20 to 80 sq ft; 75c, 10 to 20 sq ft and circles. Pipe: Full coils 17.50c; cut coils 17.75c. Lead Traps and Bends: List plus 42%.

Zinc Products: Sheet, 15.50c, fob mill, 36,000 lb and over. Ribbon zinc in coils, 14.50c, fob mill, 36,000 lb and over. Plates, not over 12-in., 13.50c; over 12-in., 14.50c.

Plating Materials

Chromic Acid: 99.75%, flake, fob Philadelphia, carloads, 21.00c; 5 tons and over 21.50c; 1 to 5 tons, 22.00c; less than 1 ton, 22.50c.

Copper Anodes: Base, 2000 to 5000 lb; fob shipping point, freight allowed: Flat untrimmed, 30.59c; oval, 30.09c; electrodeposited, 29.84c; cast, 29.59c.

Copper Carbonate: 52-54% metallic Cu, 50 lb bags, 26.50c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 45.00c fob Cleveland.

Sodium Cyanide: 96-98%, ½-oz ball, in 100 or 200 lb drums, 1 to 400 lb, 16.00c, 500 lb and over, 15.00c, fob Cleveland; 1 cent less, fob Niagara Falls.

Nickel Anodes: Rolled oval, carbonized, carloads, 48.00c; 10,000 to 30,000 lb, 49.00c; 3000 to 10,000 lb, 50.00c; 500 to 3000 lb, 51.00c; 100 to 500 lb, 53.00c; under 100 lb, 56.00c; add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 22.00c; 275-lb bbls, 20.00c.

Tin Anodes: Bar, 1000 lb and over 92.50c; 500 to 1000 lb, 93.00c; 200 to 5000 lb, 93.50c; less than 200 lb, 95.00c; ball, 1000 lb and over, 94.75c; 500 to 1000 lb, 95.25c; 200 to 500 lb, 95.75c; less than 200 lb, 97.25c, fob Sewaren, N. J.

Tin Chloride: Fob Grasselli, N. J., 625 lb bbls., price on application.

Sodium Stannate: To all consumers: in 200 or 500 lb drums, 49.50c; 100 lb, 50.50c; 50 lb, 55.00c; 25 lb, 57.50c.
To consumers other than automobile, radio and refrigerator makers: 1500 lb, 45.85c; 600 to 1400 lb, 48.50c.
To automobile, radio and refrigerator makers: 10,000 lb and over, 44.50c; 2000 to 9999 lb, 45.50c; 1000 to 1999, 46.50c; 600 to 999 lb, 48.50c.

Zinc Cyanide: 100-lb drums 36.00c, fob Cleveland; 35.00c, fob Niagara Falls.

Scrap Metals

BRASS MILL ALLOWANCES

(Based on 21.50c, Conn., for copper)
Prices for less than 15,000 lb fob shipping point. Add ¾c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	19.125	19.125	18.375
Yellow brass	15.125	14.875	14.250
Commercial Bronze			
95%	18.000	17.750	17.250
90%	17.500	17.250	16.750
Red brass			
85%	17.250	17.000	16.500
80%	16.875	16.625	16.125
Best Quality (71-79%)	16.125	15.875	15.375
Muntz Metal	14.125	13.875	13.375
Nickel silver, 5%	16.125	15.875	8.663
Phos. bronze, A, B	20.000	19.750	15.750
Naval brass	14.500	14.250	13.750
Manganese bronze	14.500	14.250	13.625

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 18.50, No. 2 copper 17.50, light copper 16.50, composition red brass 14.50, auto radiators 11.50, heavy yellow brass 10.25, brass pipe 11.50.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 18.75, No. 2 copper 17.75, light copper, 16.50-16.75, refinery brass (60% copper), per dry copper content less $5 smelting charge for brass analyzing 60 per cent or more, 15.00.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire No. 1 16.50-17.00, No. 2 15.50-16.00, light copper 14.50, No. 1 composition red brass 12.00-12.50, No. 1 composition turnings 11.50, mixed brass turnings 8.00, new brass clippings nom. 12.00-12.50, No. 1 brass rod turnings 10.00-10.50, light brass 6.00-6.50, heavy yellow brass 8.25-8.50, new brass rod ends 10.50-11.00, auto radiators, unsweated 9.50-9.75, cocks and faucets 9.50-9.75, brass pipe 9.25-9.50.

Lead: Heavy 12.00, battery plates 6.75-7.00, linotype and stereotype 14.50-15.00, electrotype 12.00-12.50, mixed babbitt 12.50-13.00, solder joints 16.50-17.00.

Zinc: Old zinc 5.00-5.25; new die cast scrap 4.50-5.00, old die cast scrap 2.50-3.00.

Tin: No. 1 pewter 55.00-57.00, block tin pipe 77.00-78.00, auto babbitt 45.00-47.00, No. 1 babbitt 45.00-48.00, siphon tops 45.00-47.00.

Aluminum: Clippings, 2S 8.50-9.00, old sheets 6.50-7.00, crankcases 6.50-7.00, borings and turnings 2.00-2.50, pistons, free of struts, 5.50-6.00.

Nickel: Anodes 16.00-17.00, turnings 12.50-13.00, rod ends 16.00-17.00.

Monel: Clippings 12.00-12.50, turnings 7.00-7.25, old sheets 10.00-10.50, rods 10.00-10.50, castings 9.00.

DAILY PRICE RECORD

	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Dec. Average	21.50	14.825	10.50	85.704	15.00	33.00	35.00	74.625
Dec. 1-18	21.50	14.80-14.85	10.50	80.00	15.00	33.00	35.00	74.625
Dec. 19-31	21.50	14.80-14.85	10.50	94.00	15.00	33.00	35.00	74.625

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum, primary ingots, 99%, del.; Antimony, bulk, fob Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery, unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

PITTSBURGH

No. 1 Heavy Melt. Steel	$40.00
No. 2 Heavy Melt. Steel	40.00
No. 1 Busheling	40.00
Nos. 1, 2 and 3 Bundles	40.00
Machine Shop Turnings	34.50-35.00
Mixed Borings, Turnings	34.50-35.00
Short Shovel Turnings.	35.50-36.00
Cast Iron Borings	36.00-36.50
Bar Crops and Plate	44.50-45.00
Low Phos. Steel	44.50-45.00
Heavy Turnings	39.50-40.50

Cast Iron Grades

No. 1 Cupola	52.50-53.50
Charging Box Cast	42.00-42.50
Heavy Breakable Cast.	40.00-41.00
Unstripped Motor Blocks	45.00-46.00
Malleable	59.00-60.00
Brake Shoes	41.00-42.00
Clean Auto Cast	52.50-53.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	40.50-41.00
R.R. Malleable	59.00-60.00
Axles	49.00-50.00
Rails, Rerolling	53.50-54.00
Rails, Random Lengths	50.50-51.00
Rails, 3 ft and under	53.00-54.00
Rails, 18 in. and under	54.00-55.00
Railroad Specialties	51.50-52.50
Uncut Tires	49.00-50.00
Angles, Splice Bars	50.00-51.00

CLEVELAND

No. 1 Heavy Melt. Steel	$39.00-39.50*
No. 2 Heavy Melt. Steel	39.00-39.50*
No. 1 Busheling	39.00-39.50*
Nos. 1 & 2 Bundles	39.00-39.50*
Machine Shop Turnings	34.00-34.50
Mixed Borings, Turnings	33.50-35.50
Short Shovel Turnings.	35.00-35.50
Cast Iron Borings	35.00-35.50
Bar Crops and Plate	44.00-44.50
Punchings & Plate Scrap	44.00-44.50
Heavy Turnings	39.00-40.00
Alloy Free Turnings	37.00-38.00
Cut Structurals	52.00-54.00

* Plus applicable freight spring-board.

Cast Iron Grades

No. 1 Cupola	58.00-62.00
Charging Box Cast	54.00-56.00
Stove Plate	54.00-56.00
Heavy Breakable Cast.	52.00-53.00
Unstripped Motor Blocks	50.00-51.00
Malleable	68.00-70.00
Brake Shoes	52.00
Clean Auto Cast	58.00-60.00
No. 1 Wheels	55.00-56.00
Burnt Cast	52.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	40.00-41.00
R.R. Malleable	68.00-70.00
Rails, Rerolling	56.00
Rails, Random Lengths	54.00-55.00
Rails, 3 ft and under	58.00-60.00
Cast Steel	58.00-60.00
Railroad Specialties	53.00-55.00
Uncut Tires	54.00-55.00
Angles, Splice Bars	58.00-59.00

VALLEY

No. 1 Heavy Melt. Steel	39.50-40.00*
No. 2 Heavy Melt. Steel	39.50-40.00*
No. 1 Bundles	39.50-40.00*
Machine Shop Turnings	34.00-35.00
Short Shovel Turnings.	36.00-36.50
Cast Iron Borings	35.50-36.00
Low Phos.	47.00-48.00

* Plus applicable freight spring-board.

Railroad Scrap

No. 1 R.R. Heavy Melt.	40.00-41.00*

* Earmarked for return to steel supplier. Price in open market, 48.00-49.00.

MANSFIELD

Machine Shop Turnings	36.50-37.50
Short Shovel Turnings.	36.50-37.50

CINCINNATI

No. 1 Heavy Melt. Steel	$39.50
No. 2 Heavy Melt. Steel	39.50
No. 1 Busheling	39.50
No. 1 Bundles	39.50
No. 2 Bundles	39.50
Machine Shop Turnings	33.50
Mixed Borings, Turnings	32.50
Short Shovel Turnings.	35.50
Cast Iron Borings	34.50

Cast Iron Grades

No. 1 Cupola Cast	55.00
Charging Box Cast	43.00
Heavy Breakable Cast.	46.00
Stove Plate	45.00
Unstripped Motor Blocks	45.00
Brake Shoes	41.00
Clean Auto Cast	52.00
Drop Broken Cast	57.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	42.00
R.R. Malleable	62.00
Rails, Rerolling	52.00
Rails, Random Lengths	50.00
Rails, 18 in. and under	55.00

DETROIT

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$34.50-35.00
No. 1 Busheling	34.50-35.00
Nos. 1 & 2 Bundles	34.50-35.00
No. 3 Bundles	34.50-35.00
Machine Shop Turnings	28.50-29.00
Mixed Borings, Turnings	28.50-29.00
Short Shovel Turnings.	29.50-30.00
Cast Iron Borings	29.50-30.00
Punchings & Plate Scrap	40.00-41.00

Cast Iron Grades

No. 1 Cupola Cast	52.00-54.00
Heavy Breakable Cast.	45.00-46.00
Clean Auto Cast	52.00-54.00

BUFFALO

No. 1 Heavy Melt. Steel	$41.50-43.50
No. 2 Heavy Melt. Steel	39.25-40.25
No. 1 Busheling	39.25-40.25
No. 1 & 2 Bundles	39.25-40.25
Machine Shop Turnings	34.00-34.50
Mixed Borings, Turnings	34.00-34.50
Cast Iron Borings	34.00-34.50
Short Shovel Turnings.	36.00-36.50
Low Phos.	45.00-47.00
Elec. Furnace Bundles.	44.00-45.00

Cast Iron Grades

No. 1 Cupola	58.00-60.00
Mixed Cupola	54.00-56.00
Heavy Breakable Cast.	49.00-50.00
Malleable	56.00-58.00
No. 1 Wheels	50.00-52.00
Clean Auto Cast	52.00-53.00

Railroad Scrap

Rails, 3 ft. and under.	50.00-52.00
Railroad Specialties	49.00-51.50

PHILADELPHIA

No. 1 Heavy Melt. Steel	$41.00
No. 2 Heavy Melt. Steel	41.00
No. 1 Busheling	41.00
No. 1, No. 2 Bundles	41.00
No. 3 Bundles	39.00
Machine Shop Turnings	34.00-34.50
Mixed Borings, Turnings	34.00-34.50
Short Shovel Turnings.	35.00-36.00
Bar Crop and Plate	47.50
Punchings & Plate Scrap	47.50
Cut Structurals	47.50
Elec. Furnace Bundles.	44.50-45.50
Heavy Turnings	43.00-44.00
No. 1 Chemical Borings	39.00-40.00

Cast Iron Grades

No. 1 Cupola Cast	51.00-52.00
No. 1 Machinery Cast.	54.00-56.00
Charging Box Cast	50.00-51.00
Heavy Breakable Cast.	50.00-51.00
Unstripped Motor Blocks	47.50-48.50
Malleable	65.00-66.00
Clean Auto Cast	52.00-54.00
No. 1 Wheels	54.00

NEW YORK

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$33.50-35.00
No. 2 Heavy Melt. Steel	33.50-35.00
No. 1 Busheling	33.50-35.00
Nos. 1 & 2 Bundles	33.50-35.00
No. 3 Bundles	31.50-33.00
Machine Shop Turnings	27.50-28.50
Mixed Borings, Turnings	27.50-28.50
Short Shovel Turnings.	29.00-30.00
Punchings & Plate Scrap	38.00-39.00
Cut Structurals	38.00-39.00
Elec. Furnace Bundles.	38.00-39.00

Cast Iron Grades

No. 1 Cupola Cast	46.00-47.00
Charging Box Cast	46.00-47.00
Heavy Breakable	45.00-46.00
Unstripped Motor Blocks	42.50-43.50
Malleable	54.00-55.00

BOSTON

(Fob shipping point)

No. 1 Heavy Melt. Steel	$31.50-32.50
No. 2 Heavy Melt. Steel	31.50-32.50
No. 1 Bundles	31.50-32.50
No. 1 Busheling	31.50-32.50
Machine Shop Turnings	27.00-28.00
Mixed Borings, Turnings	28.00-29.00
Short Shovel Turnings.	28.50-29.50
Bar Crops and Plate.	32.50-33.50
Punchings & Plate Scrap	32.50-33.50
Chemical Borings	28.00-29.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-44.00
Charging Box Cast	38.00-39.00
Heavy Breakable Cast.	38.00-39.00
Stove Plate	38.00-39.00
Unstripped Motor Blocks	36.00-37.00
Clean Auto Cast	40.00-42.00

CHICAGO

No. 1 Heavy Melt. Steel	$38.50-39.00
No. 2 Heavy Melt. Steel	38.50-39.00
Nos. 1 & 2 Bundles	38.50-39.00
No. 3 Bundles	36.50-37.00
Machine Shop Turnings	33.50-34.00
Mixed Borings, Turnings	33.50-34.00
Short Shovel Turnings.	35.50-36.00
Cast Iron Borings	34.50-35.00
Bar Crops and Plate	41.00-41.50
Punchings	49.00-50.00
Elec. Furnace Bundles.	39.50-40.00
Heavy Turnings	38.00-38.50
Cut Structurals	43.50-44.00

Cast Iron Grades

No. 1 Cupola Cast	62.00-65.00
Clean Auto Cast	62.00-65.00
No. 1 Wheels	50.00-53.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.00-47.00
Malleable	71.00-73.00
Rails, Rerolling	59.00-61.00
Rails, Random Lengths	54.00-55.00
Rails, 3 ft and under	58.00-59.00
Rails, 18 in. and under	62.00-63.00
Railroad Specialties	54.00-55.00
Angles, Splice Bars	57.00-58.00

ST. LOUIS

No. 1 Heavy Melt. Steel	$38.00-39.00
No. 2 Heavy Melt. Steel	37.00-38.00
Machine Shop Turnings	31.00-33.00
Short Shovel Turnings.	33.00-34.00

Cast Iron Grades (Fob shipping point)

No. 1 Cupola Cast	50.00-54.00
Mixed Cast	50.00-51.00
Heavy Breakable Cast.	43.00-45.00
Brake Shoes	46.00-47.00
Clean Auto Cast	55.00-56.00
Burnt Cast	47.00-49.00

Railroad Scrap

R.R. Malleable	60.00-62.00
Rails, Rerolling	56.00-59.00
Rails, Random Lengths	50.00-52.00
Rails, 3 ft and under	54.00-55.00
Uncut Tires	46.00-47.00
Angles, Splice Bars	48.00-49.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$37.00
No. 2 Heavy Melt. Steel	37.00
No. 1 Busheling	37.00
Nos. 1 & 2 Bundles	37.00
No. 3 Bundles	31.00
Long Turnings	24.50
Short Shovel Turnings.	26.00-27.00
Cast Iron Borings	25.00
Bar Crops and Plate	38.50
Cut Structurals	38.50

Cast Iron Grades

No. 1 Cupola Cast	51.00
Stove Plate	43.00
No. 1 Wheels	45.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	38.00
R.R. Malleable	45.00
Axles, Steel	39.00
Rails, Rerolling	52.00
Rails, Random Length	39.00
Rails, 3 ft and under	41.00
Angles and Splice Bars	41.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	*$25.00
No. 2 Heavy Melt. Steel	*25.00
No. 1 Busheling	*25.00
Nos. 1 & 2 Bundles	*25.00
No. 3 Bundles	*20.00
Machine Shop Turnings	*15.50
Bar Crops and Plate	25.00
Cast Steel	25.00
Alloy Free Turnings	15.50
Cut Structurals	25.00
Tin Can Bundles	20.00

Railroad Scrap

No. 1 Heavy Melting	26.00
Axles	32.00
Rails, Random Lengths	26.50
Uncut Tires	33.50

*Fob California shipping point.

SEATTLE

No. 1 Heavy Melt. Steel	$24.00
No. 2 Heavy Melt. Steel	24.00
No. 1 Busheling	24.00
Nos. 1 & 2 Bundles	22.00
No. 3 Bundles	22.00
Machine Shop Turnings	14.50
Mixed Borings, Turnings	14.50
Punchings & Plate Scrap	24.50
Cut Structurals	24.50

Cast Iron Grades

No. 1 Cupola Cast	30.00
Charging Box Cast	25.00
Heavy Breakable Cast.	24.00
Stove Plate	25.50
Unstripped Motor Blocks	24.00
Malleable	30.00
Brake Shoes	30.00
Clean Auto Cast	30.00
No. 1 Wheels	26.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	22.00
Railroad Malleable	30.00
Rails, Random Lengths	21.50
Angles and Splice Bars	23.00

LOS ANGELES

No. 1 Heavy Melt. Steel	$25.00
No. 2 Heavy Melt. Steel	25.00
Nos. 1 & 2 Bundles	25.00
Machine Shop Turnings	16.00
Mixed Borings, Turnings	15.50-16.00
Punchings & Plate Scrap	28.00
Elec. Furnace Bundles.	28.00

Cast Iron Grades

No. 1 Cupola Cast	35.00-36.00

HAMILTON, ONT.

(Ceiling prices, delivered)

Heavy Melting	$22.00
No. 1 Bundles	22.00
Mechanical Bundles	20.00
Mixed Steel Scrap	19.00
Mixed Borings, Turnings	17.00
Rails, Remelting	23.00
Rails, Rerolling	26.00
Bushelings	17.00
Bushelings, new factory, prep'd	21.00
Bushelings, new factory, unprep'd	16.00
Short Steel Turnings	17.00

Cast Iron Grades*

No. 1 Cast	37.50-38.00

* Removed from price control Aug. 9, 1947; quoted on basis of fob shipping point.

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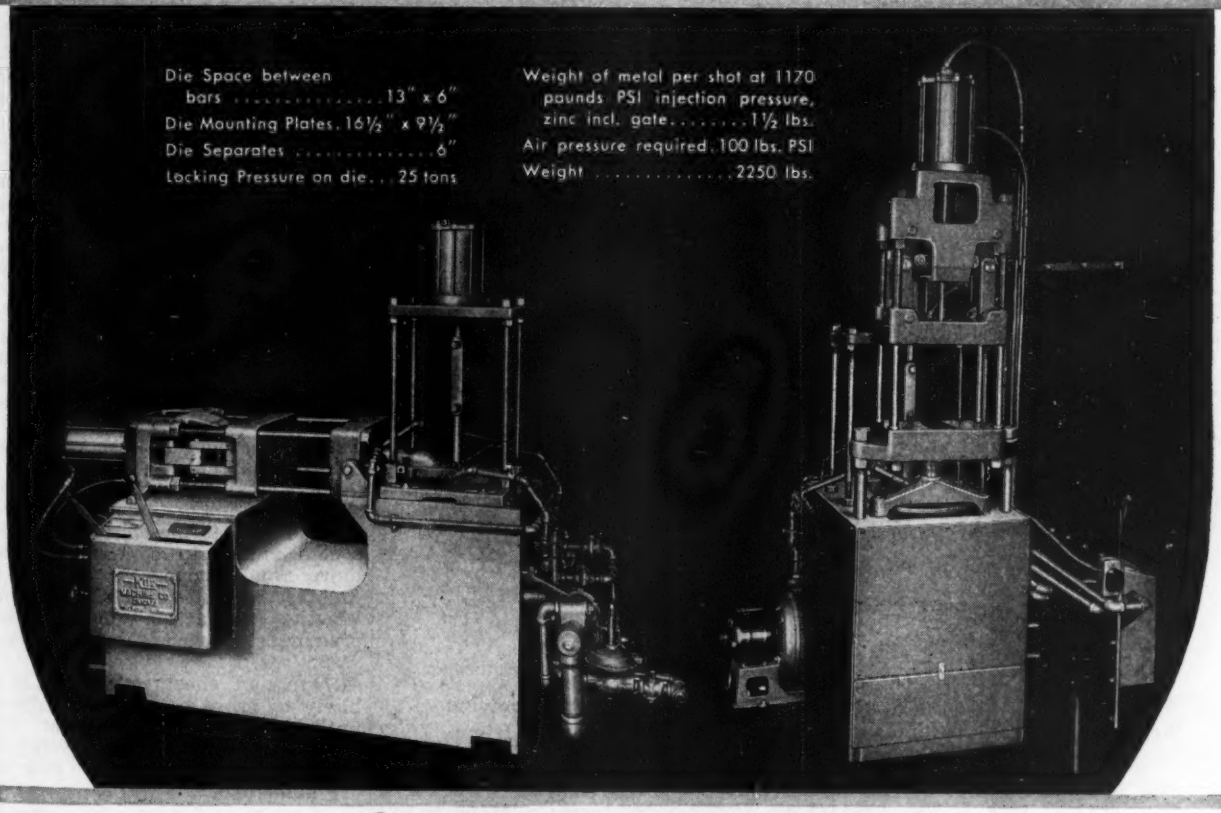
is the safest, most highly productive small die casting machine on the market! Available in horizontal or vertical center shot models, die castings weighing up to 1½ pounds in zinc are produced under high injection pressures, insuring quality, dense castings with minimum porosity. ***Compare these features:*** Center shot operation with floating nozzle always in seated contact with the die and one-piece gooseneck. Speed and power obtained by use of an air compressor to operate opening and closing of die, and metal injection plunger. Double safety lock, mechanical-electrical, prevents metal shot while die is in open position. Double toggle mechanism locking in two directions absorbs all locking pressures, operates on all four corners of die plate. Built-in ejector plate for positive ejection. Self-contained gas or oil firing unit.

Die Space between bars . . . . . 13" x 6"
Die Mounting Plates. 16½" x 9½"
Die Separates . . . . . 6"
Locking Pressure on die . . . 25 tons

Weight of metal per shot at 1170 pounds PSI injection pressure, zinc incl. gate . . . . . 1½ lbs.
Air pressure required. 100 lbs. PSI
Weight . . . . . 2250 lbs.



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• reduced "down time" on large draw press from 8 weeks to 10 hours

AIRCO TECHNICAL SALES SERVICE REPORT

PROBLEM: To put this press back into operation immediately -- without an eight week delay for a replacement part. The press, used for the production of milk cooler units, had broken through the center of the lower die bed.

SOLUTION: We recommended repair by braze-welding with Airco Bronze Rod Nos. 20 and 22. Working with two oxyacetylene torches, in 15 minute shifts, five operators completed the job in ten hours. The casting, upon cooling, held its dimension and alignment, and has been in continuous operation since July 20, 1946. The International Harvester Company estimated it saved $800 on this repair job, but more important, reduced "down time" on the draw press from 8 weeks to 10 hours.

Joseph X. Merkt
Airco Technical Supervisor
Louisville District

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AIRCO **AIR REDUCTION**

Offices in All Principal Cities

TECHNICAL SALES SERVICE – ANOTHER AIRCO PLUS-VALUE FOR CUSTOMERS

Sheets, Strip . . .

Sheet Prices, Page 334

Boston—Not only are flat-rolled carbon steel shortages forcing use of substitutes within that group, but distribution is often accompanied with direct and indirect pressures. To illustrate: One large user producing steel mill motors is behind on shipment schedules; prodded by the mill, this fabricator claims sheets are required to complete the equipment. If sheets are forthcoming, delivery can be made and some times the sheets are promised ex-quota. This situation can be multiplied many times.

The "Tinker-to-Evers-to-Chance" play is also employed. In one case, involving special alloy sheets, the consumer bought billets in Pittsburgh which will be hot-rolled in West Virginia, cold-finished in Ohio and fabricated into the finished product in Western Massachusetts. What this sheet steel eventually will cost the consumer is conjectural. Percentage-wise, the volume of cold-rolled carbon sheets being used here is out of normal balance, shortages in enameling and hot-rolled sheets being the primary reasons. More painted electro-coated zinc is replacing galvanized and galvannealed for the same reason. Some producers have no new hot-rolled sheet tonnage in sight.

New York—Most sheet sellers here entered the new year with arrearages of four to six weeks on the major grades, such as hot and cold-rolled sheets and galvanized sheets. Producers report some headway on an average, but with more tonnage going to the railroad equipment builders, consumers generally will benefit but little in the current quarter. As for new sheet capacity, they see little help in that direction until well into the second quarter. Stainless sheet supply is a little tighter, although deliveries can still be had in six to eight weeks.

Pittsburgh—Sellers have reduced first quarter quotas in line with a more realistic estimate of rolling mill schedules. Some producers also have 1 to 2 weeks carryover tonnage still on their books. Some steel officials contend a reduction in monthly allotments should be put into effect for those companies that have established own steel supply sources. It is argued that as long as the acute shortage of sheets and strip continues, such a move would appear to be for the greatest advantage of all customers. Whether such action will be taken by producers, however, remains to be seen.

Supply of sheets and strip is not likely to be in balance with demand until late this year at earliest. However, a gradual increase in output is indicated through last half this year.

Philadelphia — Sheet consumers are pressing hard for tonnage, especially in view of the possibility that the proposed voluntary allocation program, once it is set up, may further restrict first quarter quotas. In some instances, consumers might actually benefit by the allocation program, but the majority believe that they will be fortunate if present quotas are left intact.

Cincinnati — Holiday conditions brought a superficial easing of pres-

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THE ROBINSON CLAY PRODUCT CO.
AKRON 9, OHIO

R-148-6

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1

APPLICATION OF FINISH — Binks makes a long line of precision manual and automatic spray guns ranging in size from small, inexpensive guns to high precision masterpieces for production finishing. There is a Binks gun for every size and type of industry, each truly the best in its class.

2

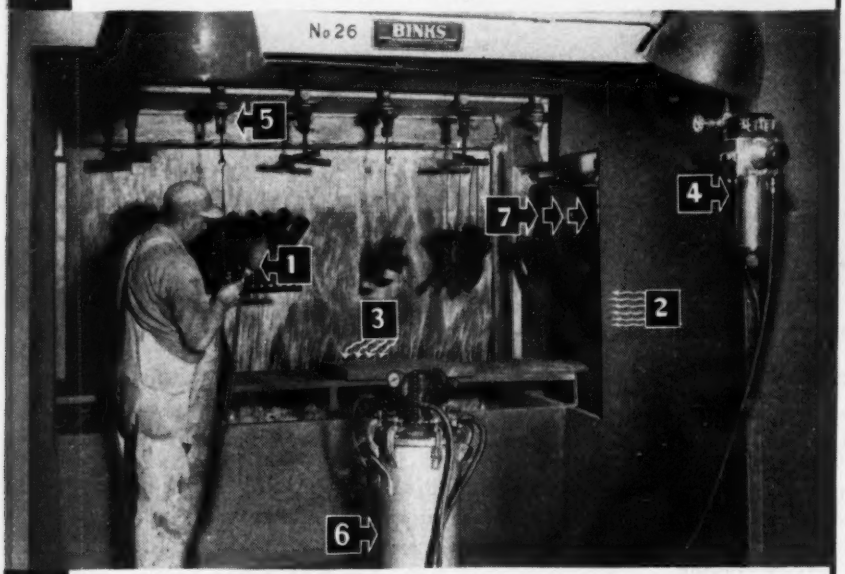
AIR SUPPLY SYSTEM — Warm, dust-free air in the spray room or booth is essential for fine finishes and health. Binks custom-built air supply systems provide the right volume of warm filtered air for maximum efficiency.

3

AIR EXHAUST SYSTEM — Fumes and paint laden air must be vented quickly. Binks exhaust systems range from simple ventilating fans to highly efficient Dynaprecipitor water-wash units that remove and reclaim all overspray.

4

COMPRESSED AIR — Binks compressors are made in many capacities to provide ample air for the operation of one or many spray guns. Binks oil and water extractors clean the air before it reaches the gun.



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PRODUCT HANDLING — Mechanical handling puts your finishing department on a fast production line basis, increases the finish quality, reduces finishing costs by eliminating hours of manual work.

6

MATERIAL HANDLING — Binks material handling systems cover every step from siphon cups that hold a pint to elaborate paint circulating systems that pipe thousands of gallons of finish past every spray booth in the plant.

7

DRYING AND BAKING — Binks furnishes drying and baking equipment tailor-made for the particular product and finish. Ovens and driers of this kind are an integral part of the finishing unit . . . part of a continuous process.

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sure on sheet mills for deliveries. District carryover into the first quarter runs four to six weeks of mill capacity, resembling the pattern throughout 1947. Mills are holding to the policy of making commitments quarterly, with the nature of present demand giving no clue to the time when supply will catch up with requirements, excepting for stainless sheets on which fairly prompt shipment can be made.

Weighted Finished Steel Price Composite

With this issue STEEL expands its market reporting service to include a monthly weighted composite price on finished steel. The new weighted composite complements but does not supplant STEEL's long established weekly finished steel price composite which continues as usual.

The new monthly weighted composite provides a measurement of the value of finished steel shipments. It is computed on the per pound base prices at Pittsburgh of 19 major steel products which currently constitute 81 per cent of all steel shipped for sale as reported by the American Iron & Steel Institute.

The new monthly composite is arrived at by multiplying the base price of each product by the tonnage of each product shipped monthly, aggregate costs then being divided by the total tonnage involved in the compilation to arrive at the composite. Where base prices vary for the same product because of size, e.g. pipe, or amount of contained metal, e.g. tin plate, the average price is used. Since extra charges vary with individual orders it is not possible to include them in calculating the composite.

Changes both in prices and in tonnages of individual products moved into consumption are reflected in the new weighted composite. However, because of the time involved in collecting the shipment statistics the published composite lags two months behind the current situation. On the other hand, STEEL's weekly finished steel composite, an unweighted arithmetical average of base prices, promptly reflects the overall price trend. See page 344 for the current composites and page 329 for the monthly weighted composite, figured back through 1938.

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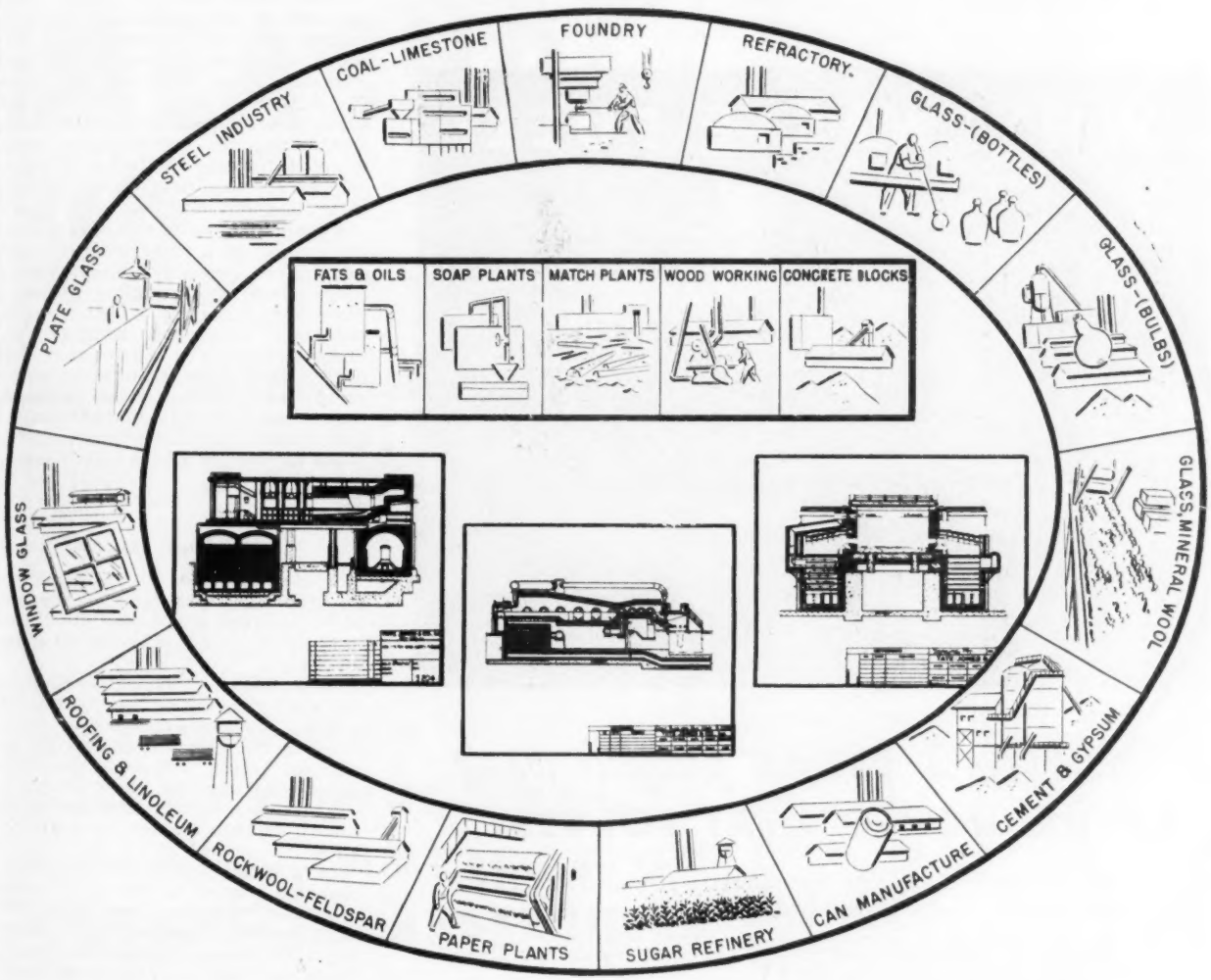

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Steel Bars . . .

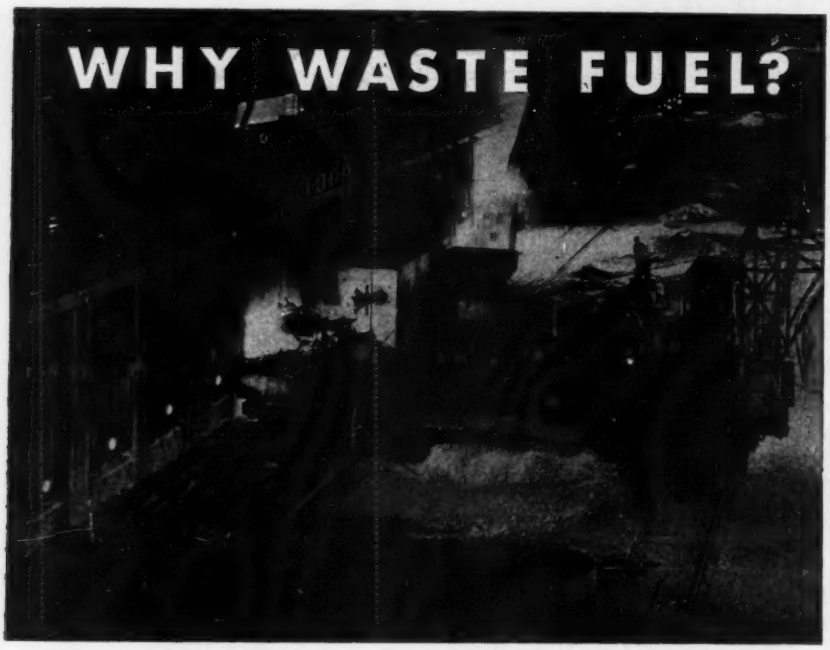
Bar Prices, Page 334

Pittsburgh—Carbon bar supply has improved slightly in recent months, extending into the smaller size classifications in some instances. However, consumers are concerned over possible reversal in this situation as result of industry's pending export commitments under the Marshall plan. Shipments of both carbon and alloy bars to cold finishers are in ample volume to meet present requirements. Cold-finished rounds are available within 30 to 60 days, with latter deliveries prevailing on smaller size classifications; narrow flats are extended 90 to 120 days. Cold finishers anticipate relatively high level of operations through most of this year. Carbon bar sellers are considering revising extra cards, notably for those extras applying on small size classifications.

Boston — Scattered openings are noted for late first quarter in most sizes of cold-drawn carbon steel bars, except small flats. Most alloys are available in five to six weeks and some improvement is noted in merchant quality hot-rolled carbon. Quality grades of the latter have eased little and in some cases are even tighter. With more producers hopeful of eliminating bulk of carryovers within the next few weeks, the bar outlook is somewhat brighter for next quarter. This schedule, however, has been at the expense of first quarter allocations. To wipe out carryovers, reasonably favorable operating factors must prevail over the next few weeks. Except for quality grades of hot-rolled carbon, consumer inventories are generally better balanced, notably in cold finished. Less satisfied with bar supply are bolt and nut shops. On the whole the outlook for this commodity substantiates earlier predictions that of the major hot-rolled carbon products bars will probably be the first to get into normal balance with demand.

New York — Hot carbon bar consumers see little relief ahead over the next three months. Their quotas are still in the process of being adjusted, generally downward. Very small sizes are still extremely tight although some users do not regard the supply as being quite that bad. Cold-drawn carbon consumers note a tightening, but contemplate getting as much tonnage as they will require. Buyers are experiencing no difficulty in getting hot and cold alloy bars.

Philadelphia — Hot carbon bar consumers report a tightening in supply and are concerned over the possibility of a still further tightening, at least in some directions, as a result of the voluntary allocation program now under discussion in Washington. Cold-drawn bar supply is not quite as free as it was, although most consumers expect no difficulty in obtaining requirements over the current quarter. Alloy bar supply also is a little tighter.



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open hearth Insulation

Plates . . .

Plate Prices, Page 335

Coatesville, Pa. — Lukens Steel Co., this city, has reduced the price of 10 per cent monel-clad steel plate to 24.00c a pound, effective as of Dec. 9, 1947.

New York — Sellers of plain carbon plates are out of the market. Important trading at this time is confined to floor plates and certain specialties. Most producers are getting caught up some on back orders, but the situation still is tight, being only second in this respect to sheets and pipe.

In addition to the four car floats reported placed in last week's issue of STEEL with the New York Shipbuilding Co., Camden, N. J., requiring 3700 tons of plates, the Pennsylvania railroad has placed ten 80-foot open deck lighters of 250 tons cargo capacity, with the American Bridge Co., Pittsburgh.

Boston — With considerable capacity scheduled for the rolling of 1947 carryovers, first quarter plate allocations are reduced and indications are that January will be a lean month for most fabricating shops and warehouses. Railroads experienced difficulty in placing orders for this quarter with former suppliers, but in several instances have managed to get on mill books as new accounts. In the acceptance of orders, some mills have not relaxed policy of turning down light tank plates. Those booking that grade and still shipping to New England are becoming overloaded. In this group also includes producers most heavily pressured for increasing freight car requirements. Another factor entering into the trend toward

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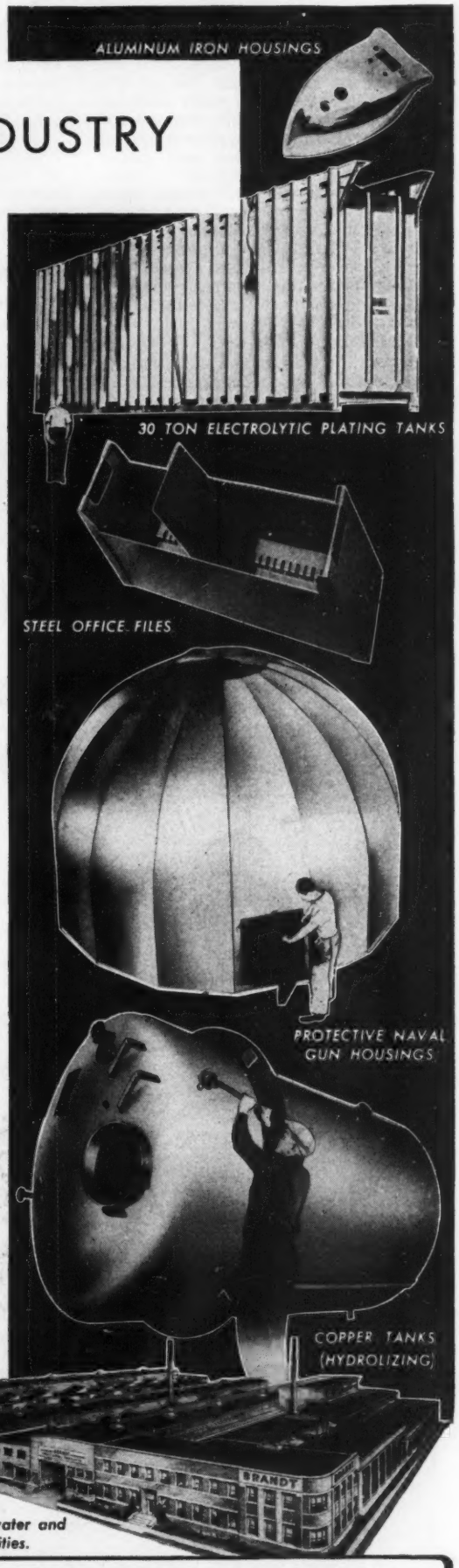

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distortion in distribution is price. Mills selling without premiums are those least selective up to now in order acceptance; they are also the backbone of the freight car supply program, being for the most part the larger producers. While demand for plate is well in excess of supply, all potential inquiry is not out; paper mill and chemical plants have expansion programs planned which have been held back by costs and shortages of materials. There is some improvement in head deliveries which range from six to eight weeks for pressed and small spun heads, although the latter in larger diameters extend into March.

Philadelphia — It will take plate producers the greater part of a month to get caught up on arrearages, with actual developments in this regard a little tighter than had been anticipated. With the holidays over, however, most plate mills will be back on better schedules, although one is limited by availability of pig iron and scrap.

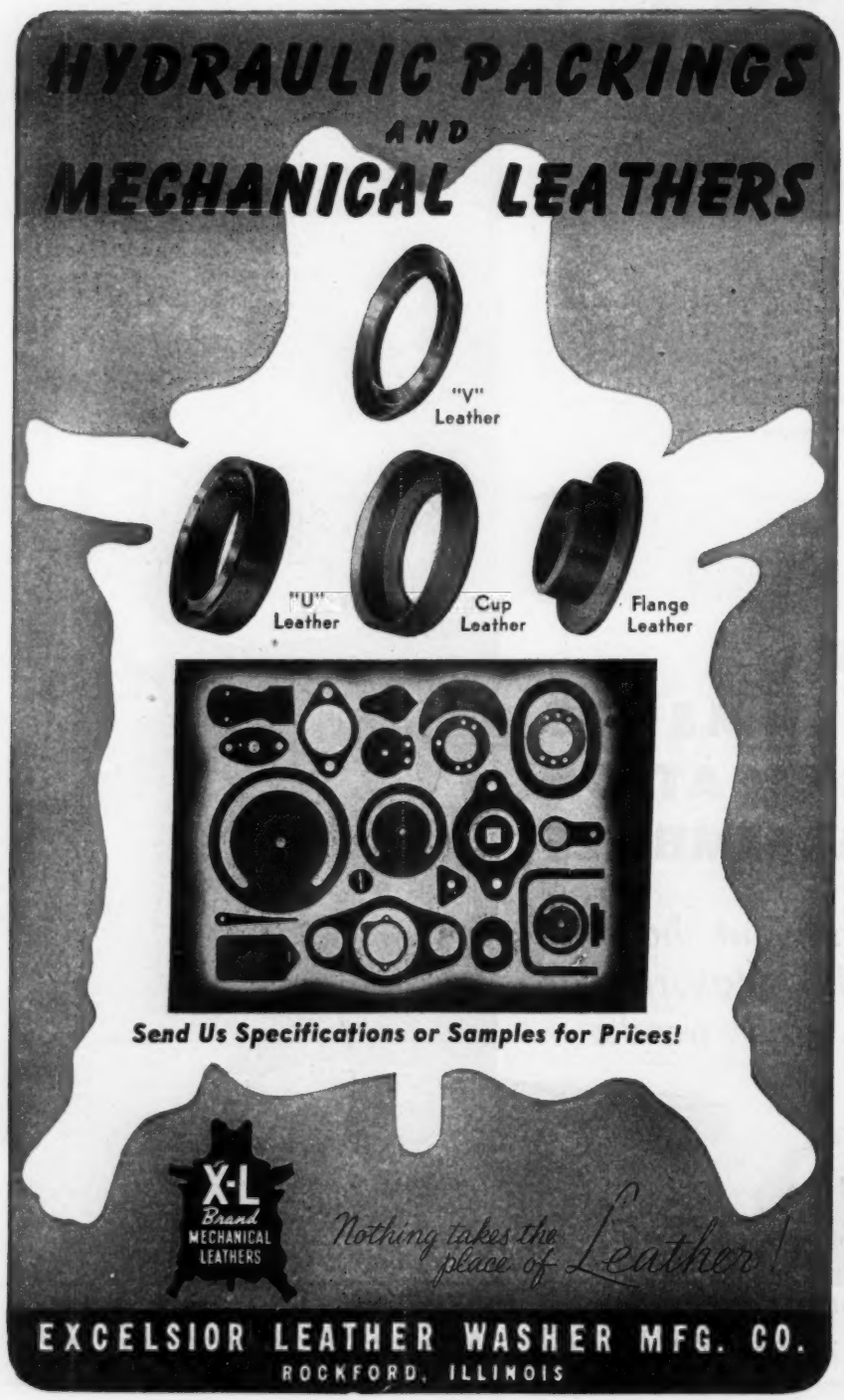
Seattle — Plate supplies are under normal and below the requirements of plants in Washington and Oregon, which report a steady volume in small contracts, chiefly for smokestacks, boilers and tanks.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 334

Boston — Concrete reinforcing bar inquiry is in excess of tonnage available to most fabricators under allocations, resulting in a dearth of estimates on individual projects. Several thousand tons are active and contractors find difficulty in placing orders for requirements. Bridge and highway demand is heavier, including 500 tons for Connecticut. Contracts include close to 500 tons for piers, Mystic river bridge, Boston, and a mill building, New Haven.

Seattle—Reinforcing bar mills have sufficient order backlogs to carry them well through the first quarter. Northwest Steel Rolling Mills has resumed operations after a short shutdown. Several important public works and industrial projects are pending.



Auto Output in 1947 Tops 5,000,000 Units

Passenger car and truck production in the United States and Canada passed the 5,000,000-mark Dec. 29, according to *Ward's Automotive Reports*, which figured only 6675 units were needed on that day to meet the goal. On this basis, with the week's production estimated around 70,000, the grand total for 1947 will approximate 5,065,000 which would top the 1937 record of the industry and place 1947 as the third best year in history, exceeded only by 1929 and 1941.

The record was achieved only by virtue of an appreciable speedup in yearend operations of a number of companies and a suspension of plans for complete shutdowns between holidays by others. Saturday work and 9-hour shifts were scheduled by several of the Chrysler divisions, indicating a strengthening of steel supplies. Since they involved premium pay, such schedule extensions now have been terminated.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

	1947†	1946†
January	366,205	109,910
February	393,636	101,637
March	443,588	134,071
April	445,137	229,867
May	404,191	263,445
June	421,466	217,943
July	400,944	315,963
August	364,478	358,457
September	444,501	339,774
October	461,536	406,561
November	418,368	389,645
December	500,282*	393,223
12 mos.	5,064,332*	3,260,496

* Preliminary.
† All monthly totals revised to conform with statistics of Automobile Manufacturers Association.

Estimates for week ended:

Dec. 13	117,902	96,887
Dec. 20	120,657	96,754
Dec. 27	78,964	67,070
	1948	1947
Jan. 3	72,000	53,437

Estimates by Ward's Automotive Reports

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Specify INTERNATIONAL Graphite Electrodes for—Slow consumption—High current capacity—Low rate of oxidation—High thermal conductivity—High degree of purity—Consistently uniform properties and dimensions—Low cost per ton of production.

International Graphite & Electrode Corp.

SAINT MARYS, PA.

Wire . . .

Wire Prices, Page 335

Boston—Lack of balance in wire inventories is most pronounced among producers making a multiplicity of sizes and grades of products requiring a wide range of wire needs. Screw manufacturers and most fabricators who have attempted to broaden lines of manufactured wire goods since the war are in this category. Heading wire demand is heavy and in excess of supply. Much the same situation holds for round wire for flattening and many high carbon specialties. Tempering facilities and other processing equipment for many specialties are taken up for weeks ahead. Rods, notably low carbon, are limited in supply. While equipment of wire mills is strained to meet overall demand, there are some soft spots, including music wire which can be shipped frequently from stock or at least in three to four weeks. Rope wire supply is sufficient for current demand and automotive buying has slackened, indicating wire inventories are ahead of sheets and other products required by that industry.

Chicago — Except for wire rope and electrical building wire, for which inventories are substantial, demand for all merchant and manufacturers' grades of wire is beyond production by a good margin. Distributors of merchant products seek deliveries as soon as possible after start of the new year. Requirements for cushion spring, bedding and automotive wire are extremely heavy and growing. Need is also heavy for paving and building fabric, also telephone wire and strand, the latter particularly from rural areas.

New Type

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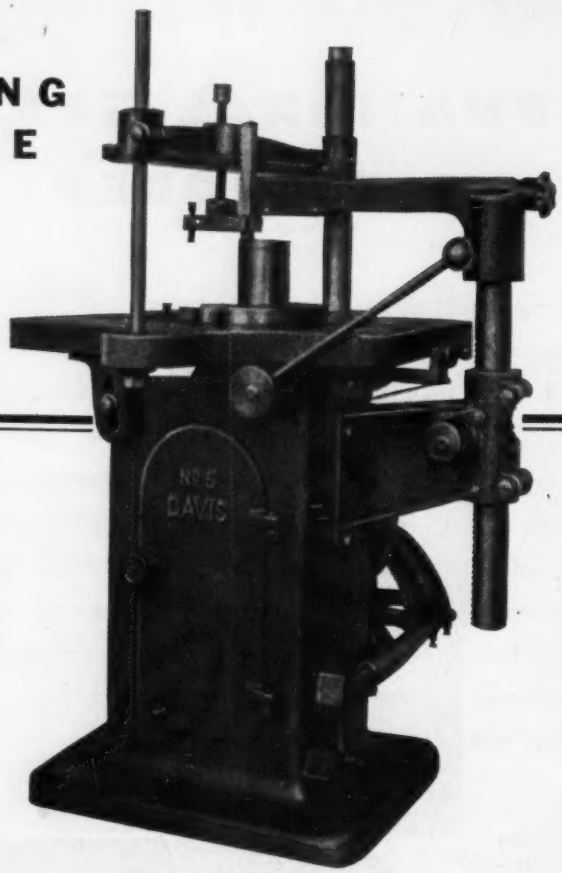
TILTING TABLE



• Taper keyways may be cut by inclining table in either direction from horizontal. Scale indicates exact taper per foot. Cutter operates in vertical position, with resistance arm adjusted to different cutters. Table-type feed with adjustable feed stop.

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Structural Shapes . . .

Structural Shape Prices, Page 335

Boston — What will be the largest 1948 inquiry for fabricated structural steel in New England, superstructure, Mystic river bridge, Boston, closes Jan. 15, although an extension may be requested because of the limited time to take-off firm estimates by prospective fabricators. This cantilever bridge and truss spans with long approaches requires 35,000 tons. Industrial demand has slackened with delivery an important factor in the limited volume out. April delivery is wanted in most cases, but larger fabricating shops are beyond that period, generally May or June. District shops have backlogs of small miscellaneous work to the extent of prospective allocations.

New York—District structural fabricators anticipate a spurt in buying this month, involving projects scheduled to get under way next fall. As a matter of fact, some of the larger shops, not necessarily located in this district, are booked so far ahead that they could not begin to supply tonnage before the fall season. Meanwhile, more private work is coming out than heretofore.

Philadelphia — Activity in the structural steel market is slack here. Little business has been placed and new inquiry is spotty. Latest projects before the market include 400 tons for hangars for the Municipal Airport and 300 tons for a veterans hospital addition at Wilmington, Del.

Tubular Goods . . .

Tubular Goods Prices, Page 335

Seattle — Potential demand for cast iron pipe is larger than normal and several major jobs are expected to be out early in 1948. Delivery dates have not improved and selling agencies are facing stiff competition with other types of pipe offering quicker delivery.

American Steel Foundries Enters Machine Tool Field

American Steel Foundries, Chicago, has acquired the machine tool business of King Machine Tool Co., Cincinnati, manufacturer of the King vertical boring mill and Sebastian lathes. The business will be operated as the King Machine Tool Division of American Steel Foundries.

General policies of the King company will be continued, according to Thomas Drever, president of American Steel Foundries. The King division will be operated and managed by R. D. Brizzolara and C. F. Elmes, vice presidents. Charles F. Muller, formerly president of King Machine Tool Co., has joined the management staff.

The entry of American Steel Foundries into the machine tool field follows by five years its entry into the hydraulic machinery business through acquisition of the Elmes Engineering Works, Chicago.

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Pig Iron . . .

Prices advance $2 to $3 a ton in some districts. Supplies remain tight

Pig Iron Prices, Page 336

Cleveland — One leading company announced an across-the-board increase of $2 a ton effective Dec. 29 on merchant pig iron sales based at Chicago, Duluth, Erie, Pa., and Toledo, O. This makes this company's basic pig iron prices $37.50 at Chicago, Erie and Toledo and $38.00 at Duluth. Differentials for No. 2 foundry, malleable and bessemer iron remain unchanged. Cleveland producers of pig iron reported no price changes.

Youngstown — Carnegie - Illinois Steel Corp.'s No. 1 blast furnace has resumed, after being down for about three weeks for extensive repairs. This makes all blast furnaces here active.

Birmingham — Sloss-Sheffield Steel & Iron Co., this city, has advanced prices $3 a ton, effective Jan. 1, on its various grades of pig iron.

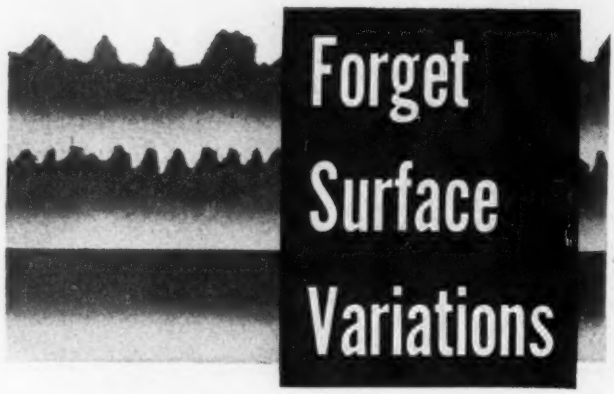
New York — Unless retarded too greatly by winter weather conditions, the flow of pig iron into this district this month should be slightly heavier, as one important supplier in eastern Pennsylvania contemplates capacity operations and better output is indicated at another producing point. Coke supply also is expected to prove adequate for current needs, as most consumers have fair inventories on hand. Various foundries observed long weekends over the past two weeks and some were closed down for a period of ten days or so, due primarily to inadequate pig iron and scrap stocks. District consumers, while anticipating a somewhat better movement of iron this month, are not counting on receiving anywhere near as much as they could use.

A leading Buffalo producer suspended production at one furnace Dec. 26 due to lack of coke. This operator now has three furnaces in blast, with one on silvery iron. This curtailment will be reflected in shipments into the New York district. Pig iron prices are strong, with the probability that higher prices will be quoted shortly by various furnaces which have not already taken action recently.

Buffalo—Foundries throughout this area continue to slash operations as the pig iron supply situation becomes tighter. Unable to obtain pig iron, the Massey Harris Co. has shut down the malleable section of its Batavia plant, which has been making castings for farm implement parts. Producers are falling far short of total demands. Two producers scheduled to withdraw furnaces show no change in operations. Withdrawal of a merchant stack is being deferred, despite a loss in tonnage produced, to fill urgent pleas for iron from hard-pressed foundries. Talk of higher pig iron prices follows a yearend boost of $2 a ton for silvery grades. Tightness of the merchant iron market reflects an increased flow of metal for ingot production.

Boston—Poor quality of raw materials hampers blast furnaces in attaining production goals as an increasing number are confronted with relining. While numbers of these units are not selling any part of output in this area, the general shortage of iron has an indirect effect. One eastern unit is losing 60 tons of production daily because of ore trouble and other deterrents. No more foundry iron is in sight from Buffalo and with the exception of basic, silvery and other specialties, supply has practically narrowed to Mystic. Basic melters are in a critical position, operating hand-to-mouth and any extended tie-up of transportation will force shutdowns in most cases. A few foundries are in the same position.

Pittsburgh — Inadequate pig iron supply is expected to continue the major production problem for most foundries in 1948. Less than 60 per cent of merchant pig iron requirements for this district currently is available to the trade, and there is no indication of much improvement until the Monessen, Pa., furnace is ready for operation in the second quarter this year. Only the acute scarcity of pig iron has made it possible for restricted supply of coke and cast scrap to meet requirements of foundries here. Many foundries will have to rely to a greater extent on the relatively poorer quality beehive coke as result of the recent purchase by Sharon Steel Corp. of the 60 Koppers' ovens of Domestic Coke Corp., Fairmont, W. Va. Scarcity of



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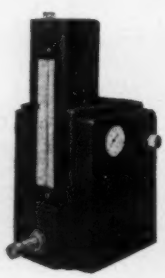

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good quality and non-uniform grades of coke continue to limit pig iron output to range of 10-15 per cent below rated capacity of blast furnace units.

Some consideration is being given to raising pig iron prices by merchant producer here, but no announcement of such action yet has been made.

Philadelphia — Supply of pig iron is expected to be a little freer this month, with the larger of the two stacks at Swedeland, Pa., now operating at full capacity on basic and the smaller on foundry iron.

Chicago—Pig iron situation here is the worst it has been since end of the war, this being the result of tremendous foundry demand and a deteriorating blast furnace condition. Inland Steel Co. blew out its Indiana Harbor No. 6 furnace on Dec. 23, leaving only 38 of the district's 41 potential stacks in production. The Inland unit will be down about 90 days for relining and repairs. Reduction of blast furnace activity falls heaviest on foundries because steel plants will be obliged to utilize bulk of iron output as hot metal to maintain steelmaking operations. Not only are foundries desperate for pig iron, but the scrap situation has become acute. Inadequacy of scrap has caused prices to skyrocket to fantastic levels. First quarter casting outlook, therefore, is depressing.

Pig Iron Production Declines in November

New York — Production of pig iron, ferromanganese and spiegeleisen totaled 5,015,182 tons in November compared with 5,227,747 tons in October and 4,434,711 tons in November, 1946, according to the American Iron & Steel Institute. This brought output for the first 11 months of 1947 to 54,030,522 tons against 41,344,055 tons for the like 1946 period. Pig iron output totaled 4,936,000 tons in November compared with 5,163,702 tons in October, making the 11-month total 53,408,021 tons against 48,471,731 tons in the like period a year earlier.

More Purchased Scrap To Be Available in 1948

Steel mills and foundries last year consumed 53.1 million gross tons of scrap, of which 25.4 million tons was purchased or open-market scrap and 27.7 million tons was home or plant scrap.

The consumption of purchased scrap was 5 per cent above the previous record established in 1942, and 25 per cent above the 1946 melt, according to the Institute of Scrap Iron & Steel Inc., Washington. While consumption of purchased scrap was at an all-time high, use of home scrap and pig iron fell short of their previous tops, indicating a disproportionate load was thrown on purchased scrap.

"When statistics for 1947 are analyzed it will be seen that the critical situation in purchased scrap was not so much a shortage of it as it was the persistent unprecedented demand, in which eight consecutive years of abnormal requirements were climaxed by an all-time record," says Edwin C. Barringer, executive secretary of the institute.

Sources of the 25.4 million tons of purchased scrap were as follows: Industrial, 6 million tons; railroads, 4 million tons; dealer scrap from auto junking, collections, demolition, shipbreaking and other dealer sources, about 16 million tons. In addition to the 25.4 million tons used, about 1 million tons was added to consumers' inventories.

For 1948, the institute predicts an increase in the availability of open-market scrap.

Factory scrap is expected to remain fairly constant at 12 per cent of the weight of new steel shipped by the mills. Offerings by railroads will be about the same or slightly lower than in 1947. Shipbreaking will not yield a larger tonnage unless the Maritime Commission decides to sell some of the layup fleet of Liberty ships.

Automobile graveyard scrap should develop a substantial increase in view of the probability of sustained new car production and easing in the market for new cars. Farm and city collection scrap is likely to be more plentiful as new autos, appliances and other articles become easier to buy and assuming that the scrap price continues high enough to encourage collectors. Imports, which were negligible in 1947, would provide a greater tonnage.

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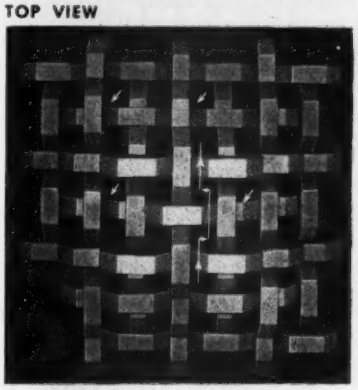
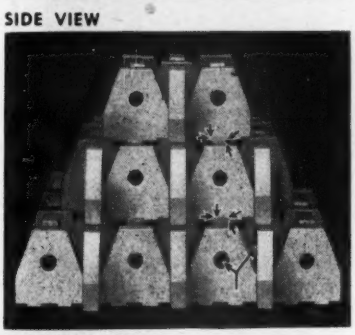
SEAVER 4-WAY LOCKED CROSS-VENT

CHECKER BRICK – *the improved* BASKET-WEAVE

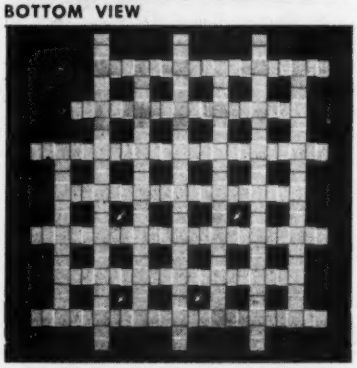
TOP VIEW



SIDE VIEW



BOTTOM VIEW



TOP VIEW Arrows show continuous flues:—square, open flues from top to bottom. May be used with or without tubular inserts. Cross-vents (indicated by line) give equalized heat and air over complete checker area, turbulence and high heat exchange.

SIDE VIEW Arrows show 4-Way lock: top and bottom—sideways in each direction. Lock is part of brick—expands and contracts with brick—cannot unlock, twist or spiral. Connected arrows show cross-vents.

BOTTOM VIEW Here again arrows show continuous flue with square open flue from top to bottom.

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Scrap . . .

Increases of $1 to $4 in some foundry grades of scrap reported at Cleveland

Scrap Prices, Page 340

Cleveland — Further tightening in scrap supplies is reflected in increases last week of $1 to $4 in some grades suitable for foundries. Because of the tightening of supplies, there are instances where scrap is moving to foundries considerably above the range of price quotations covering the bulk of transactions. However, last week was relatively quiet in the scrap market, owing to the yearend holiday season. Thus far in this area there has been no severe winter weather to hamper the collection, preparation and movement of scrap. There continues to be speculation as to when steelmakers will come back into the open market for scrap and cause a test of the present formula price of $39 to $39.50 for heavy melting steel, which is double that of the price when Office of Price Administration regulations ended. For some time, steelmakers have been relying largely on scrap earmarked to them from their steel customers at the formula price.

Pittsburgh — End of the stalemate in scrap market activity is expected momentarily. Mill inventories have been reduced substantially during the past few weeks, and it is just a matter of time before buying of substantial tonnages will get under way. With brokers and dealers attempting to clear up old orders before yearend, quoted prices have been largely nominal. Trade opinion is naturally mixed on prospect of mills holding to recently established voluntary price ceilings at 100 per cent above OPA levels. However, chances of achieving this objective are considered better than a few weeks back, with many large brokers going on record as being in favor of such action to stabilize prices. It is contended that exorbitant prices do not generate more scrap. However, the heavy influx of material following the sharp price advance last October indicates that such price fluctuations free considerable tonnage held back for speculative reasons. Some success is reported on efforts of consumers to bring low phos scrap prices in closer relationship with that for heavy melting steel. Indicated acute shortage of pig iron over coming months is expected to bolster prices for cast scrap items.

New York — Little scrap moved out of this district last week due to heavy snows. Meanwhile, brokers' buying prices were strong but unchanged. A clearer picture of the whole situation is expected to come during the first full week of the new year.

Philadelphia — Scrap prices held unchanged here last week, but undertone of the market was strong. Heavy snowfalls in the East contributed to strength of the market last week. Most district consumers have sufficient scrap on hand to tide them over for the time being, although an early test of the market is anticipated.

Buffalo — Hopes are prevalent in the scrap trade that the turn of the year will end the better than month-old price deadlock existing between dealers and leading mills. Additional strength and rising prices in cast grades bolster dealers' hopes for a nearby ending of the stalemate with sales at prices above the prevailing bid of $39.25 a ton for No. 2 heavy melting and bundles. Canadian buying interest also is reported here at the level of the local mills' bid. Dealers maintain their stand of refusing to recognize such a bid, pointing out that they have been forced to pay above the mills' bid to cover previous sales. Strong tendencies dominate the cast market with No. 1 cupola changing hands at $58 to $60 a ton. However, sales of mixed cupola are reported as low as $50.

Cincinnati — Iron and steel scrap market turned dormant during the holiday season, most interests expecting a price test on mill tonnages soon. The tonnage shipped against the formula price was considerably off from previous volume. Cast scrap moved higher under impact of eager demand. Some foundries pinched for pig iron and scrap face restive labor forces because of reduced hours.

Chicago—Transactions were light over the yearend in steelmaking scrap with prices unchanged in a firm market. Mills adhered to their offering price of $39 a ton, delivered, for heavy melting steel, but this price failed to attract tonnage from brokers or dealers. The real market test is expected to come in mid-January when steelmakers will seek large ton-

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nages to sustain the current high operating rate. In the meantime, inventories are being dissipated. Railroad scrap holds at its fantastic high level as foundries, starved for pig iron, seek melting material.

St. Louis—Scrap shipments dropped farther last week due to the holiday season factor as well as to reluctance of dealers to put more taxable profits on their books before the year end. Heavy melting steel prices remain near $40 while cast figures vary widely according to the need of the melter. Average of No. 1 cupola stays around $47 to $50, but sales as low as $40 and as high as $60 have been reported. The scrap industry here is marking time in anticipation of a price rise next month. Both shipments and new orders are expected to continue slow until mid-January. Mill reserves have sunk to three to four weeks' needs and the larger foundries to the point of secrecy. Smaller foundries frankly are on a hand-to-mouth basis.

Warehouse . . .

Warehouse Prices, Page 337

Pittsburgh—Steel distributors are watching closely the pending developments originating from the Marshall plan as reflected in voluntary mill action in revising customers' allotments to meet the augmented steel exports resulting from this program. Inventory position of nearly all warehouse interests is well below level necessary to meet even the urgent needs of customers for such items as sheets and strip, small sized carbon bars, plates and most structural steel items.

Boston—Demand for hot-rolled carbon products, especially sheets, plates and structurals, is in excess of supply and warehouses have slight hope of improving inventories on these products this quarter. Allocations have been revised downward, notably on carbon sheets. Most distributors now are balanced on cold-finished bars, but their supplies of nails and hot-rolled bars in some sizes and shapes, notably flats, are short. Alloys, tool steels and some types of small tubing are in ample supply. Several steel warehouses have added aluminum sheets to their regular stocks.

Chicago—The inadequacy of steel supply is falling heavily on warehouses, with consumers seeking to make up deficits by buying whatever they can get from jobbing interests. Demand has rolled up into staggering proportions which cannot be accommodated. Warehouse stocks are diminishing and with reduced mill quotas to be the rule in first quarter the outlook is not promising. Only alloys and stainless are in comfortable position, but even here demand is showing a strengthening tendency. Carbon flat-rolled products, bars, shapes and plates are in greatest demand.

Tin Plate . . .

Tin Plate Prices, Page 335

Pittsburgh — Output of tin mill products last year is estimated at about 4.3 million net tons, in contrast to 3.7 million in 1946, a year in which strikes accounted for most of the lag. Still further improvement in tin mill production is indicated for this year, with some interests forecasting about 4.8 million tons. Trend toward greater use of electrolytic is indicated throughout the coming year, while some sellers anticipate substantial increase in export directive tonnage allotments.

Recent advance in Grade A tin from 80 to 94 cents per pound may not be the last increase, with some interests expecting $1 pig tin before the end of this year.

Most sellers closed out 1947 with relatively little tin plate carryover tonnage on their books, having "blocked out" part of fourth quarter rolling schedules for this purpose. Normal tin mill production schedules have been resumed following brief interruptions over year end holidays.

Cleveland — Republic Steel Corp. reported its tin plate prices for 1948 will follow those recently announced by other leading producers.

Rails, Cars . . .

Track Material Prices, Page 335

Chicago — Barmakers wound up fourth quarter with substantial carryover, this falling heaviest in the smaller sizes of carbon steel, although the heavier were not far behind. Only alloys are in good position and even here considerable quickening has occurred in recent weeks. Considerable

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effort will be made through trimmed customer quotas to get current with commitments as early as possible in first quarter. Drop forgers and builders of heavy machinery report heavy inquiries, many of which cannot be quoted because of inadequate bar supply. Requirements of farm implement manufacturers also are great.

New York — Substantial buying of diesel-electric locomotives continues to be a feature of the railroad market, with the Southern Pacific closing on 40 and the Long Island on 33. Considerable car work also is being figured.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 336

Pittsburgh — Further tightening in foundry oven coke supply for foundries in this district is expected to result from the reported sale of Domestic Coke Corp., Fairmont, W. Va., to Sharon Steel Corp., Sharon, Pa. The Fairmont interest has 60 Koppers ovens and shipped an estimated 6500 tons monthly to this district. These commitments are expected to be cleared up by Feb. 1, after which Sharon Steel probably will absorb complete output of the plant.

To offset the loss of this supply source many foundries will be forced to turn to beehive coke, an item already scarce and of inferior quality. Most steel producers have been selling little if any by-product coke tonnage in the open market, although some tonnage is said to be available at distant points, such as Daingerfield, Texas. However, high freight charges involved eliminate such sources for most foundries.

Despite this development most interests here contend the critical pig iron supply situation will remain the controlling production factor in the months ahead. While the overall coke supply problem is not expected to be a major production obstacle, there is growing concern as to quantity of desired quality available for metallurgical purposes. Reflecting growing shortage of beehive coke, an increase of 50 cents a ton for Connellsville furnace coke to a range of $12 to $13 is noted on recent sales.

Philadelphia — Foundry oven coke prices have been advanced from $16.90 to $17.75 a ton at Philadelphia and Swedeland, Pa., ovens. The advance is ascribed in part to losses now being taken on gas commitments. Meanwhile, foundry coke supply has tightened as a result of the withdrawal from the eastern market of the Domestic Coke Corp., Fairmont, W. Va., acquired by the Sharon Steel Corp.

Oven foundry coke has advanced 90 cents to $18.75, Kearny, N. J., ovens.

Refractories . . .

Refractories Prices, Page 336

Pittsburgh — Producers of refractory brick anticipate continued high operating schedules through 1948. Exceptional heavy demand has prevented most interests from making much progress against extended order backlogs during closing months of 1947. Demand outlook for this year indicates no let-up in pressure for refractory brick deliveries, reflecting extensive blast furnace and coke oven relining programs in addition to considerable expansion in the latter operating facilities. Some interests go so far as to predict 4 to 5 years good business ahead on basis of estimated relining programs in the offing. Most order backlogs extend 8 weeks at least.

Canada . . .

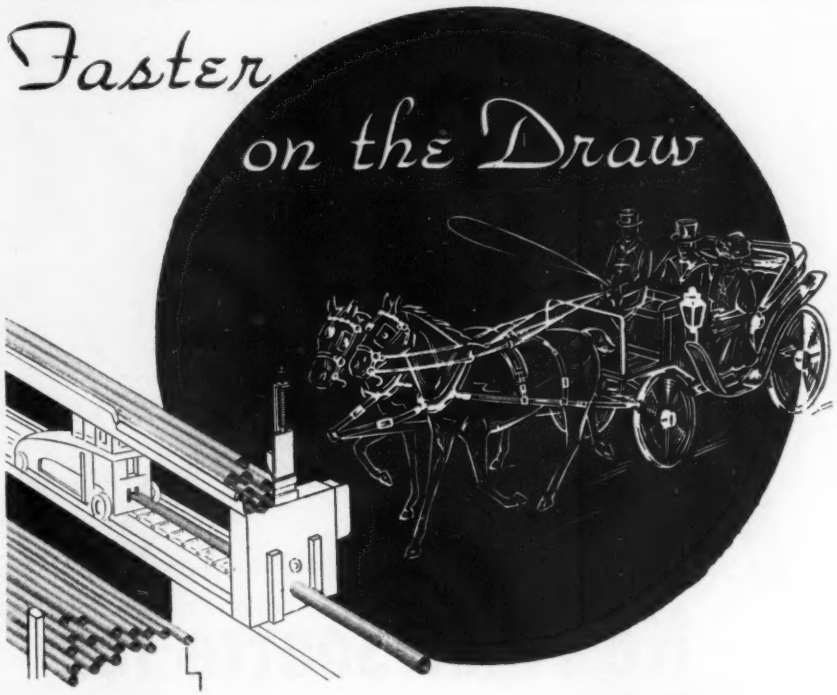
Toronto, Ont.—While production of steel ingots and castings moved upward in October to the highest monthly rate since last March, output of pig iron fell slightly below the September level. However, production of both iron and steel in October was more than double that for the corresponding month last year when the big three Canadian steel plants were forced to cut output due to strikes.

For October production of pig iron amounted to 163,335 net tons, or 71.4 per cent of total capacity, compared with a rate of 74.1 per cent in September. October output of ferroalloys was 14,691 net tons.

Production of steel ingots and castings totalled 256,461 tons in October, or 86.7 per cent of capacity, compared with 79.2 per cent for the month immediately preceding. Output for the month included 247,171 tons of steel ingots and 9290 tons of steel castings.

In both iron and steel making operations for October, there was a sharp falling off in the use of purchased scrap, with increased consumption of scrap of consumers' own make. This is said to be due to the

Faster on the Draw



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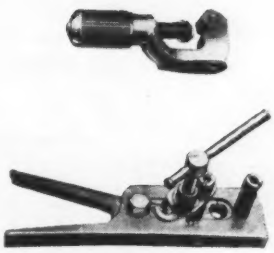

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serious shortage that has developed in available scrap supply in Canada.

Following are comparative iron and steel production figures in net tons:

	Steel Ingots Castings	Pig Iron	Ferroalloys
Oct. 1947	256,461	163,335	14,691
Sept. 1947 ...	234,188	169,630	11,152
Oct. 1946	123,841	74,958	8,448
10 mos. 1947..	2,440,025	1,630,149	127,393
10 mos. 1946..	1,874,687	1,107,025	95,859
10 mos. 1945..	2,454,061	1,508,082	158,162

Personnel Changes Announced by Inland

Inland Steel Co., Chicago, last week announced the appointment of John F. Smith Jr. as general manager of sales, effective Jan. 1, succeeding Albert C. Roeth who has retired under the company's pension plan.

Mr. Smith has been with Inland since 1929, in 1946 being appointed assistant manager of sales of the Sheet and Strip Division, after serving in various company posts previously.

Simultaneously the company announced appointment of John J. Davis Jr. as manager of sales, Railroad Division; William D. Truesdale Jr. as manager, Claim Division; and William E. Geidt as manager, Advertising Division. Mr. Davis and Mr. Truesdale, respectively, succeed William J. Hammond and Ernest M. Bannister, both of whom are retiring under the company's pension plan. Mr. Geidt replaces Keith J. Evans, who will devote his entire time to his duties as advertising manager of Joseph T. Ryerson & Son Inc., a subsidiary of Inland.

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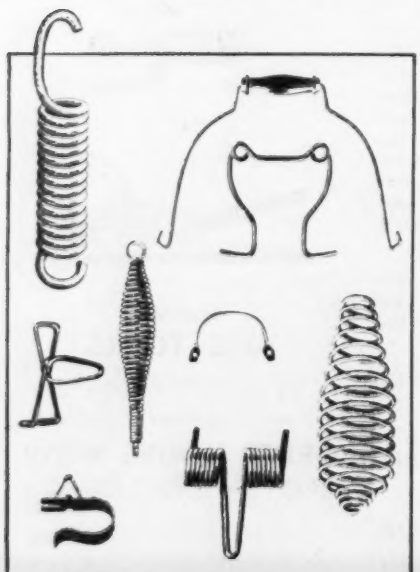

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OBITUARIES . . .

Samuel Kobrosky, founder, Samuel Kobrosky & Co. Inc., Springfield, Mass., dealer in scrap iron and metals for over 50 years, died recently.

—o—

Charles F. Conn, sales manager, Distributor and Replacement Parts Division, Trico Products Corp., Buffalo, died recently at his home in that city.

—o—

Oscar M. Polk, chairman, Sheffield Corp., Dayton, O., died recently of a heart attack, which occurred two days before his 71st birthday. At the time of his death, he was also director of the Threadwell Tap & Die Co., Greenfield, Mass.

—o—

Hans B. Kraut, 66, chairman, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., died at Tucson, Ariz., Dec. 26. Mr. Kraut, who received his mechanical engineering degree in Munich, Germany, was manager, machinery department, Joseph T. Ryerson & Son, Chicago, before becoming vice president and general manager of Giddings & Lewis in 1924. He served as president of the company from 1929 until 1945, and long was active in the affairs of the National Machine Tool Builders' Association.

—o—

John A. Javers, 40, assistant purchasing agent, Harnischfeger Corp., Milwaukee, died Dec. 23.

—o—

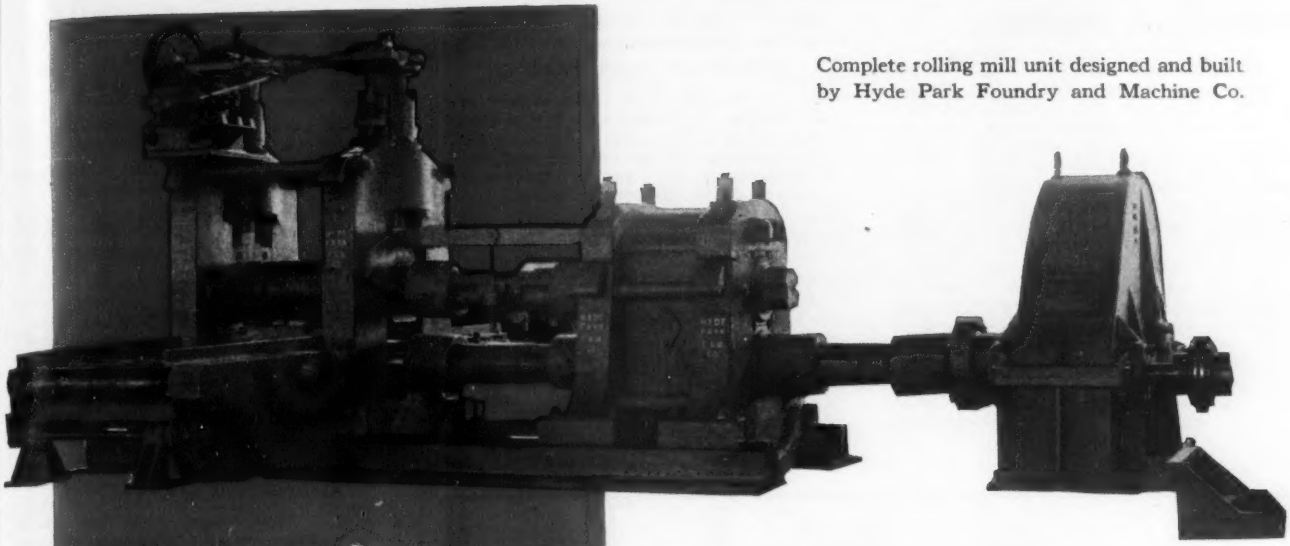
George B. Crafts, 62, for many years general counsel for Warren Bros. Roads Co., Cambridge, Mass., steel and machinery manufacturer, died Dec. 27 after a long illness. Mr. Crafts had retired in 1946.

—o—

Radcliffe Denniston, 71, onetime vice president of the Clum Mfg. Co., Milwaukee, producer of automotive equipment, which he helped found in 1915, died Dec. 21.

—o—

Charles Newcomb, 73, a vice president, Rogers Brown-Lavino Co., Philadelphia, and long an outstanding figure in eastern pig iron circles, died recently at his home in that city. Affiliated with the iron and steel industry for more than 50 years, Mr. Newcomb began with Phoenix Iron Co., Phoenixville, Pa., later becoming identified respectively with offices in Philadelphia, with Matthew Addy & Co., Crocker Bros., Rogers Brown & Crocker Bros., and Rogers Brown-Lavino Co.



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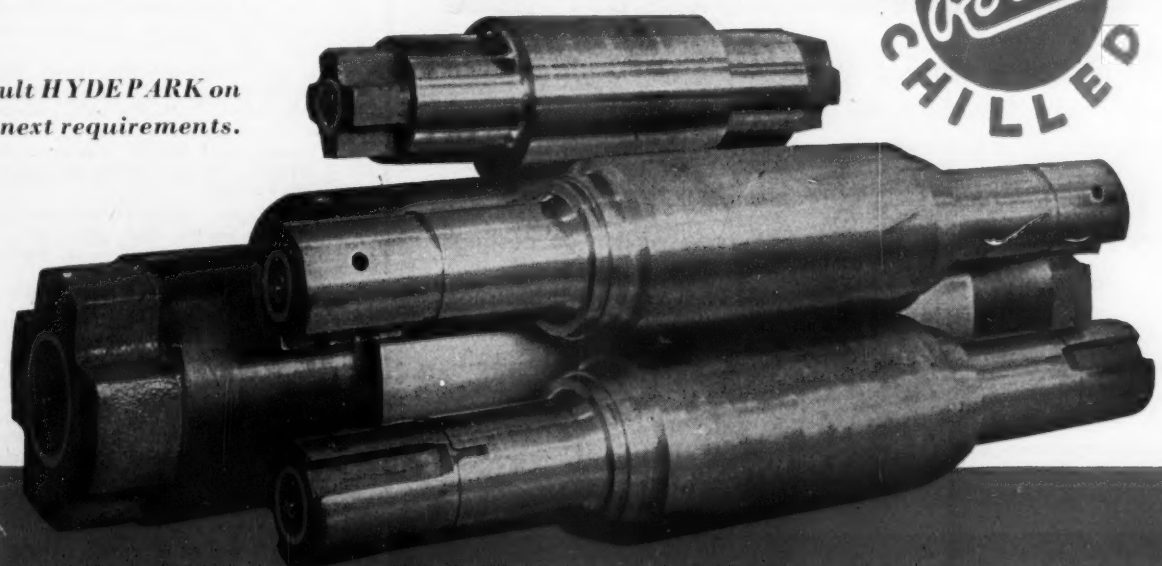


HYDE PARK FOUNDRY AND MACHINE CO.

Hyde Park, Pa. (Pittsburgh District)

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1600 tons, cold strip mill building, Detroit Steel Corp., New Haven, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; Leo F. Caproni, New Haven, structural engineer and architect.

700 tons, Alfred E. Smith Memorial addition, St. Vincents Hospital, West Twelve St., New York, to Lehigh Structural Steel Co., Allentown, Pa.

410 tons, bridge, Peoria, Ill., for state, to Laclede Steel Co., St. Louis; Michael J. McDermott & Co., Chicago, contractor; bids Nov. 21.

200 tons, bottling plant, Coca Cola Co., Springfield, Mass., to Phoenix Bridge Co., Phoenixville, Pa.

155 tons, airport terminal building, South Bend, Ind., to Mississippi Valley Structural Steel Co., Decatur, Ill.; S-L-A-B Construction Co., South Bend, Ind., contractor.

STRUCTURAL STEEL PENDING

6500 tons, superstructure, East Bridge, 14th St. bridges, U. S. Route 1, over Potomac river, Washington; bids Jan. 15, district commissioners; contract includes steel girder superstructure with bascule draw space, mechanical and electrical equipment.

35,000 tons, superstructure, cantilever bridge and truss spans, Mystic river bridge, Boston; bids Jan. 15.

1500 tons, 21-story office building, 59th St. and Park Ave., New York, bids asked; Emery Roth & Sons, architects.

1000 tons, 18-story apartment, 70th St. and Park Ave., New York, pending; George F. Pehlem II, architect.

1000 tons, Anthony Campagna apartment, 61 Washington Square, New York, bids asked.

775 tons, Indianapolis-Fall Creek local control project, including nine-span bridge; bids Jan. 8, U. S. Engineer, Louisville, Ky.

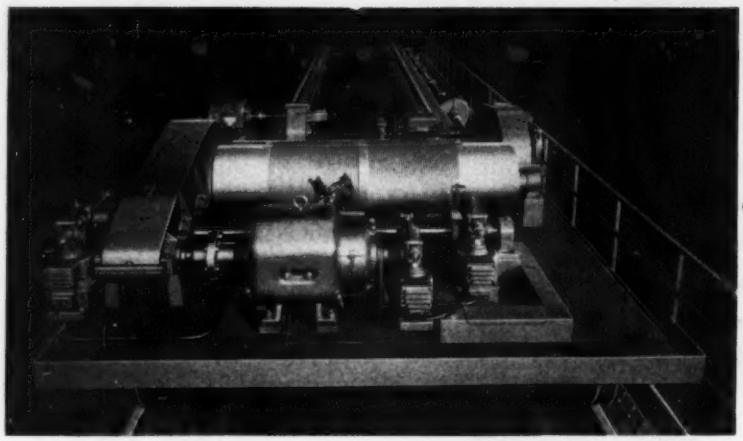
600 tons, store, L. Bamberger & Co., Morristown, N. J., bids asked.

450 tons, addition, Dudley St. station, Metropolitan Transit Commission, Boston.

375 tons, completion, Harlan county dam, Harlan county, Nebr.; bids Jan. 29, U. S. Engineer, Kansas City, Mo.

225 tons, stringer bridge, Ayer-Harvard, Mass.; bids in Dec. 30, State Department of Public Works, Boston.

BEDFORD CRANES



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REINFORCING BARS . . .

REINFORCING BARS PLACED

200 tons, cold strip mill building, Detroit Steel Corp., New Haven, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; Leo F. Caproni, New Haven, structural engineer and architect.

REINFORCING BARS PENDING

1780 tons, improvement work, Los Angeles County Drainage Area, California; bids Jan. 5, U. S. Engineer, Los Angeles.

1775 tons, spillway and intake structure, Dam "B", Jasper, Tex.; bids Jan. 27, U. S. Engineer, Galveston, Tex.; work also takes 200 tons, structural steel; 53,000 linear feet, steel bearing piles; 30,000 square feet, steel sheet piling.

1500 tons, concrete dam and spillway, Mount Morris Reservoir flood control project, Genesee river, New York; bids Jan. 15, U. S. Engineer, Buffalo; work also requires 105 tons structural steel.

1385 tons, outlet works, San Angelo dam, San Angelo, Tex.; bids Jan. 21, U. S. Engineer, Galveston, Tex.

1000 tons, veterans hospital, Grand Island, Neb., for U. S. Veterans Administration, Lovering Construction Co., Minneapolis, and Carlson Construction Co., Sioux Falls, S. D., jointly low on general contract; bids to U. S. Engineer Office, Omaha, Dec. 15.

950 tons, Sunbury flood protection project, lower Susquehanna river section; bids Jan. 9, U. S. Engineer, Baltimore; work also requires 150,000 square feet sheet steel piling.

900 tons, veterans hospital, Iron Mountain, Mich., for U. S. Veterans Administration; bids postponed to Jan. 22.

650 tons, veterans hospital, Ft. Wayne, Ind., for U. S. Veterans Administration; bids postponed to Jan. 23.

437 tons, power plant and tunnels, Springfield, Ill., for state; Alzina Construction Co., Springfield, Ill., low on general contract; bids Dec. 16.

165 tons, Indianapolis-Fall Creek local protection project, including nine-span bridge; bids Jan. 8, U. S. Engineer, Louisville, Ky.

146 tons, Healthwin hospital, St. Joseph County, Ind.; Gust K. Newburgh Construction Co., Chicago, low on general contract; bids Dec. 16.

125 tons, gate structure and control house, channel intake, San Bernardino county, California; bids Jan. 8, U. S. Engineer, Los Angeles.

Unstated, office building, Walgreen Co., Chicago; bids Jan. 15.

PLATES . . .

PLATES PENDING

Unstated, 55-inch steel plate penstock and 38-inch discharge pipe, for Sunnyside, Wash.; bids to Bureau of Reclamation, Denver, Jan. 29.

PIPE . . .

CAST IRON PIPE PLACED

2480 tons, centrifugally cast water pipe; lot 4, including 60,000 feet 8-inch and 40,000 feet 12-inch, Department of Public Works, Chicago, to U. S. Pipe & Foundry Co., Burlington, N. J.

579 tons, centrifugally cast water pipe; lot 3, Group 2, 30,000 feet 8-inch, Department of

Public Works, Chicago, to U. S. Pipe & Foundry Co., Burlington, N. J.

CAST IRON PIPE PENDING

Unstated, 29,000 feet, 8 and 6-inch cast iron pipe; also alternates, fittings, pumps and concrete reservoir; bids to South Cle Elum, Wash., Jan. 17; W. T. Batcheller, Seattle, engineer.

RAILS, CARS . . .

RAILROAD CARS PLACED

Chicago, Indianapolis & Louisville, 350 freight cars, including 300 fifty-ton high-side gondolas, to Pullman-Standard Car Mfg. Co., Chicago and 50 seventy-ton mill type gondolas to Pressed Steel Car Co., Pittsburgh.

New York, Chicago & St. Louis, 400 seventy-ton gondolas, to American Car & Foundry Co., New York.

Spokane, Portland & Seattle, 500 fifty-ton steel box cars, to the Northern Pacific shops; twenty 16,000-gallon tank cars, to General American Transportation Co., Chicago.

Wabash, 150 fifty-ton box cars to Pressed Steel Car Co., Mt. Vernon, Ill., and 50 seventy-ton gondolas to same company, McKees Rocks, Pa.

LOCOMOTIVES PLACED

Long Island Railroad, 33 diesel-electric switch engines, to American Locomotive Co., New York; 18 are to be of 600 horsepower each and 15 of 1000 horsepower.

Southern Pacific, 20 diesel-electric freight locomotives and 20 diesel-electric switch engines, placed.

Texas & Pacific, eleven 1000-horsepower diesel-electric switch engines, to Electro-Motive Division, General Motors Corp., La Grange, Ill.; and one 1500-horsepower switch engine, to American Locomotive Co., New York.

CONSTRUCTION AND ENTERPRISE

ALABAMA

ANNISTON, ALA.—Monsanto Chemical Co. has awarded a $100,000 contract to Andrews, Dawson & Shenesey for construction of a service building.

MONTGOMERY, ALA.—Dairy Producers has let a $279,000 contract to Bear Bros. to construct a milk processing plant.

CALIFORNIA

BAKERSFIELD, CALIF. — Royal Tallow & Soap Co., 1260 Davidson St., San Francisco, will build a $100,000 plant.

CONNECTICUT

BRIDGEPORT, CONN. — Sikorsky Division, United Aircraft Corp., South Ave., has awarded $250,000 contract to Edwin Moss & Sons Inc., 555 Grant St., for construction of an assembly and flight building.

INDIANA

MUNCIE, IND.—Warner Gear Division, Borg-Warner Corp., Ohio Ave. and Willard St., has awarded an $80,000 contract to A. J. Glaser Co., for construction of an addition to Plant No. 3 on Yorktown Rd.

SOUTH BEND, IND. — Oliver Corp. has awarded a $200,000 contract to Ragnar-Benson Inc., 4744 W. Rice St., Chicago, for construction of a 1-story foundry.

OHIO

ASHLAND, O.—F. E. Myers & Bros. Co. has a rehabilitation program under way to increase production of its pumps, water systems, hand and power sprayers and hay unloading tools.

CADIZ, O.—Hanna Coal Co. is building a new tipple at its Georgetown coal mine near here. Tipple will have a capacity of 5000 tons per shift, and is the fifth at the Georgetown project.

CLEVELAND—United Welding & Engineering Co., 11811 Beulah Ave., is building a new plant at 9414 Richmond Rd. and is installing new equipment.

MANSFIELD, O.—Humphrey's Mfg. Co., 201 E. Fifth St., is increasing its manufacturing space with a $130,000 factory addition. Firm makes cast iron plumbing fixtures.

MANSFIELD, O.—Mansfield Rapid Transit Inc., H. W. Arnold, president, will spend $311,000 on improvements, including a new garage, new buses and $30,000 worth of maintenance and repair equipment.

OKLAHOMA

CUSHING, OKLA. — Westinghouse Electric Corp. has been awarded a contract to furnish all electrical equipment for a crude oil pipe line owned by Shell Pipe Line Corp. and Texas Pipe Line Co.

PENNSYLVANIA

LANCASTER, PA. — Armstrong Cork Co., Liberty and Mary Sts., plans to build a $250,000 laboratory. Plans are by Lamb & Harmon Associates, 11 E. 44th St., New York.

SOUTH CAROLINA

ANDERSON, S. C.—Deering-Milliken Co. has awarded a $4 million contract to Daniel Construction Co., Greenville, for erection of a rayon weaving plant.

TENNESSEE

MEMPHIS, TENN.—Westinghouse Electric Co., 366 Madison Ave., has awarded a $75,000 contract to Seth E. Giem, Porter Bldg., for construction of a warehouse.

TEXAS

BEAUMONT, TEX.—Magnolia Petroleum Co.

REDUCE
LOST
TIME
due to
REFRACTORY
REPLACEMENT
The labor and materials used for refractory replacement are a terrific drag on production time. You can retrieve these wasted hours by eliminating the cause—and the best way is to USE GLOBE SUPERIOR LADLE BRICK. Wire cut or dry pressed, they will bring about CLEANER STEEL, LOWER PER TON BRICK COST, and SAVE TIME LOST IN REFRACTORY REPLACEMENT.
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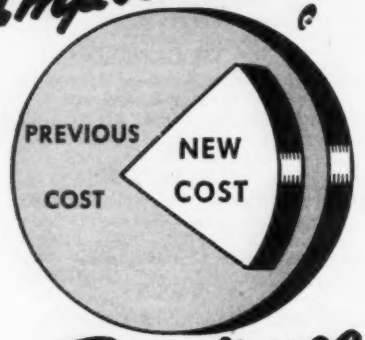

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At Heywood-Wakefield, for instance, re-designing of the coach seat pedestal for assembly by resistance welding had the following results:

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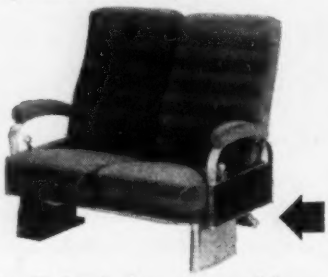
3. **A higher quality seat pedestal was produced.**



You'll find the story of how this was done along with "How 33 operations were cut to 5"; "Simple machine makes petcock wrenches faster"; "How to resistance weld without heavy duty power lines"; and "How to design for projection welding", in

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IT PAYS TO WELD

PROGRESSIVE WELDER COMPANY
3050 E. OUTER DRIVE, DETROIT 12, U.S.A

will construct refinery additions and two-stage crude distillation units at a cost of $1,329,000.

DALLAS, TEX.—Massey-Harris Co., 615 S. Marquette St., Racine, Wis., will build a $390,000 warehouse here.

HOUSTON, TEX.—Banks Moreland Co. and Graver Construction Co., 5343 McCormick St., will spend $350,000 on a joint plant expansion.

MC GREGOR, TEX.—Western Stove Co., H. Honer, president, Waco, will build a $450,000 stove factory.

UTAH

OGDEN, UTAH—Solar Corp. has awarded a $130,000 contract to James Leck Co., 211 S. 11th St., Minneapolis, for construction of a building for the manufacture of storage batteries.

SALT LAKE CITY, UTAH—Standard Oil Co. of California, 225 Bush St., San Francisco, has awarded a $5 million contract to Bechtel Corp., 220 Montgomery St., San Francisco, for construction of a refinery unit.

WEST VIRGINIA

DE HUE, W. VA.—Youngstown Sheet & Tube Co., Youngstown, is mechanizing its coal mine here. Firm also plans to build a new coal cleaning plant for its local byproduct coke plant.

WEIRTON, W. VA.—Lorentzen Co., New York, maker of hardware, is building a plant here. Operations are expected to be under way late this month.

CANADA

EDMONTON, ALTA. — Standard Iron Works Ltd. plans to build a $150,000 tank and plate shop addition.

HAZELTON, B. C. — Silver Standard Mines Ltd. plans a $100,000 project to include installation of a mill, construction of several buildings and ore bin and installation of waterlines.

SILVERTON, B. C.—Van Roi Mines Ltd. will spend $100,000 on a silver, lead and zinc development, including mill installation.

SURF INLET, B. C.—Surf Inlet Consolidated Gold Mines Ltd. will spend $150,000 on developing a mine. Engineer is Charles Mettzel, c/o owner.

LAC DU BONNET, MAN. — Metalloy Corp., 1320 Rand Tower, Minneapolis, will spend $150,000 on a mining and concentrating plant and developing lithium deposits in Cat Lake area.

BRANTFORD, ONT.—Steel Co. of Canada will build a $100,000 factory addition.

CHELMSFORD, ONT. — Nickel Offsets Ltd., 372 Bay St., Toronto, will spend $100,000 on a mining development.

RED LAKE, ONT.—Starrat-Olsen Gold Mines Ltd. will build a milling plant, auxiliary shops and other facilities coincident with a mining development. Cost is about $250,000. Engineer is R. K. Kilborn, 100 Adelaide St. W., Toronto.

TORONTO, ONT.—Fenimore Iron Mines Ltd., 80 Richmond St., will spend $200,000 on a mining development in north end of Labrador Trough in northern Quebec.

TORONTO, ONT.—Vandervell Products (Canada) Ltd., London, England, will build a $600,000 plant and office here. Engineer is G. L. Wallace, 35 Isabella St.

TORONTO, ONT.—Star Expansion Bolt Co. Ltd., 68 Sherborne St., will build a $60,000 plant. Architect is W. S. Hale, 53 Gerrard St.

DUHAMEL, QUE.—Villa Lead Mining Corp. Ltd. c/o G. H. Wood & Co., 611 Temple Bldg., Toronto, plans a $150,000 mining development.

LITTLE RIVER, QUE.—Brantford Coach & Body Co. Ltd., Bell's Hill, has awarded a $60,000 contract to W. Rourke Ltd. for construction of a factory.

MONTREAL, QUE. — Commercial Alcohols Ltd., Notre Dame St. E, will reconvert a plant and warehouse at a cost of $150,000.

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